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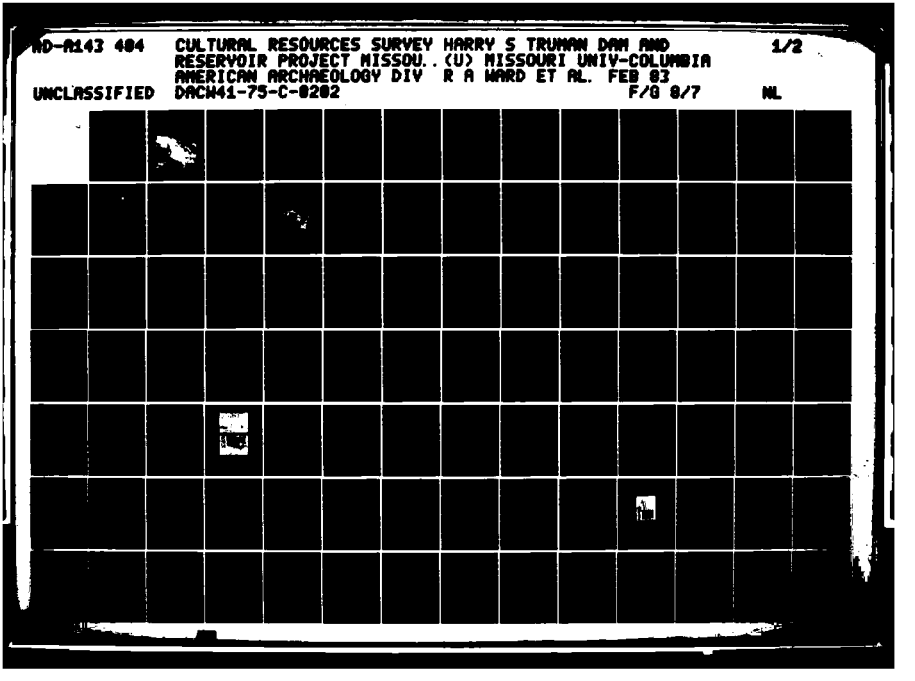

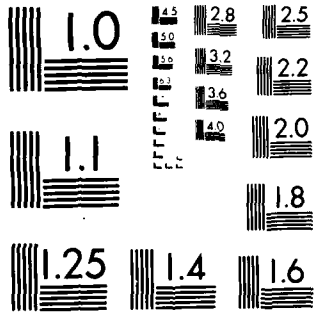

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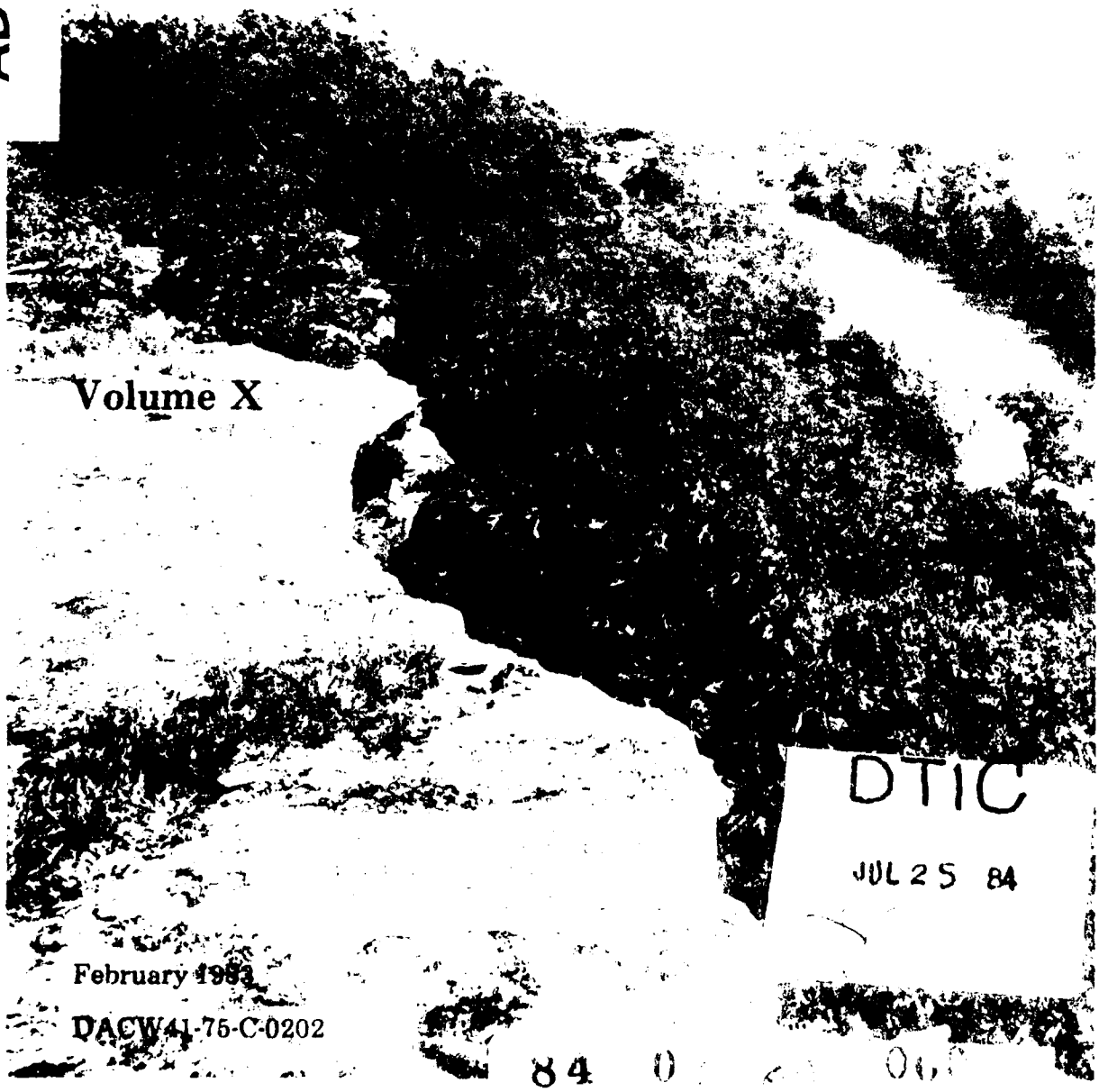

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Artifact Analysis	Osage River	Tebo Creek

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The ten volumes report the results of a cultural resources survey in the Harry S. Truman Dam and Reservoir Project, Henry, Benton, St. Clair, and Hickory counties in southwestern Missouri. The combined volumes relate the findings of historical, architectural, archeological surveys conducted between 1975 and 1977. Volume I contains an outline of Osage River history to serve as a background for historical studies; Volume II is a historical gazeteer. Volume III contains the architectural survey of the reservoir. Volumes IV

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through IX report the archeological survey of the reservoir. Volume IV is a description of the archeological survey, the results of that survey, and an analysis of prehistoric settlement-subsistence patterns in the reservoir area. Volume V contains analyses of surface collections obtained during the survey, and includes studies of chipped stone tools, ground stone tools, hematite, ceramics, and projectile points.

Volume VI consists of an interpretation of the Euro-American settlement of the lower Pomme de Terre River valley. Volume VII is a study of the results of preliminary testing at several sites in the lower Pomme de Terre River valley. Volume VIII contains the results of excavations in rock shelters along the Osage River. Volume IX contains studies relating to tests conducted in early occupation sites in the reservoir area, and an analysis of some Middle Archaic materials.

Finally, Volume X contains four environmental study papers, detailing the bedrock and surficial geology, the historic plant resources, and special studies of the soils and geology or portions of the reservoir.

Block 7.

Russell L. Miller, Stephen A. Chomke, Andrea L. Novick, Charles E. Cantley, Janet E. Joyer, R. A. Ward, T. L. Thompson, C. V. Haynes, F. B. King, and D. L. Johnson.

CULTURAL RESOURCES SURVEY
HARRY S. TRUMAN DAM AND RESERVOIR PROJECT
VOLUME X
ENVIRONMENTAL STUDY PAPERS

by

R. A. Ward and T. L. Thompson
C. V. Haynes
F. B. King
D. L. Johnson

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REPORTS OF THE

CULTURAL RESOURCES SURVEY

HARRY S. TRUMAN DAM AND RESERVOIR PROJECT

Volume I: CHRONOLOGY OF OSAGE RIVER HISTORY, by Curtis H. Synhorst. 399 pp.

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PART I

BEDROCK AND SURFICIAL GEOLOGY OF THE HARRY S. TRUMAN RESERVOIR AREA, WEST-CENTRAL MISSOURI

by

Ronald A. Ward and Thomas L. Thompson

INTRODUCTION

This report deals with the nine-county area in which the Harry S. Truman Reservoir is located. The Missouri Geological Survey became involved in the area in 1974, with major interest concentrated in the Pomme de Terre River Valley. This report relies heavily on existing published and unpublished geologic information for the nine-county area and is not the result of extensive new field investigations.

A discussion of the physiography of the area gives the reader a sense of perspective in which the sections on "Bedrock Geology" and "Surficial Geology" are presented. "Bedrock Geology" deals with the bedrock, defined as "a general term for the rock, usually solid, that underlies soil or other unconsolidated, superficial material" (Gary 1972: 67). The deposits lying above the bedrock are discussed under the heading of "Surficial Geology"; surficial deposits are defined as "unconsolidated and residual, alluvial, or glacial deposits lying on bedrock or occurring on or near Earth's surface; it is generally unstratified and represents the most recent of geologic deposits" (Gary 1972: 714).

Special appreciation is extended to Dr. William H. Allen, who initiated our involvement in the project, and who was in charge of activities until his resignation from the Survey in 1975.

PHYSIOGRAPHY

The area of concern in this report is located within two major physiographic provinces (Figs. 1 and 2): the Ozark Plateaus and the Great Plains. The boundary between these areas is drawn roughly at the westernmost exposure of Mississippian-age strata.

The Ozark Plateaus province is subdivided into the Salem and Springfield plateaus. The Salem Plateau (Bretz 1965: 30) is underlain by Ordovician-age strata in the area covered by this report, and is generally characterized as having moderate to high relief with steep slopes, especially adjacent to major river valleys and their tributaries. Bluffs 30 meters or more in height are not uncommon. The ridges in most areas are flat and narrow, but considerable expanses of rolling country intervene between major river valleys.

The Springfield Plateau (Springfield Plain of McMillan 1976), which lies west of the Salem Plateau, is underlain by Mississippian-age strata. The juncture of these two plateaus is known locally to the south as the Eureka Springs Escarpment, although it is not particularly well developed in the Truman Reservoir area. The character of this area is much the same as that of the Salem Plateau, although it has slightly less relief and the slopes are less steep.

The Ozark Plateaus province is joined on the west by the Great Plains province (Fig. 2). The Osage Plains

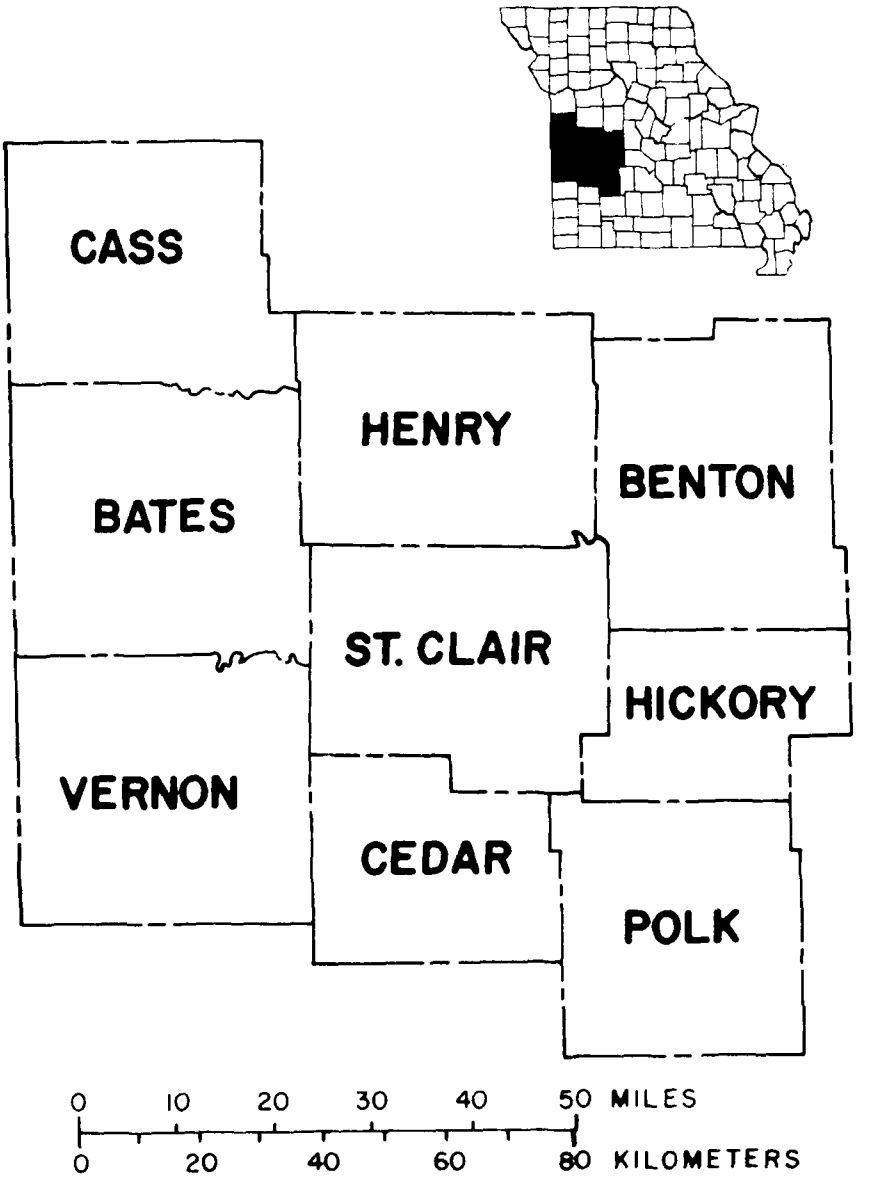

Figure 1. Index map of Missouri, with the nine-county study area illustrated.

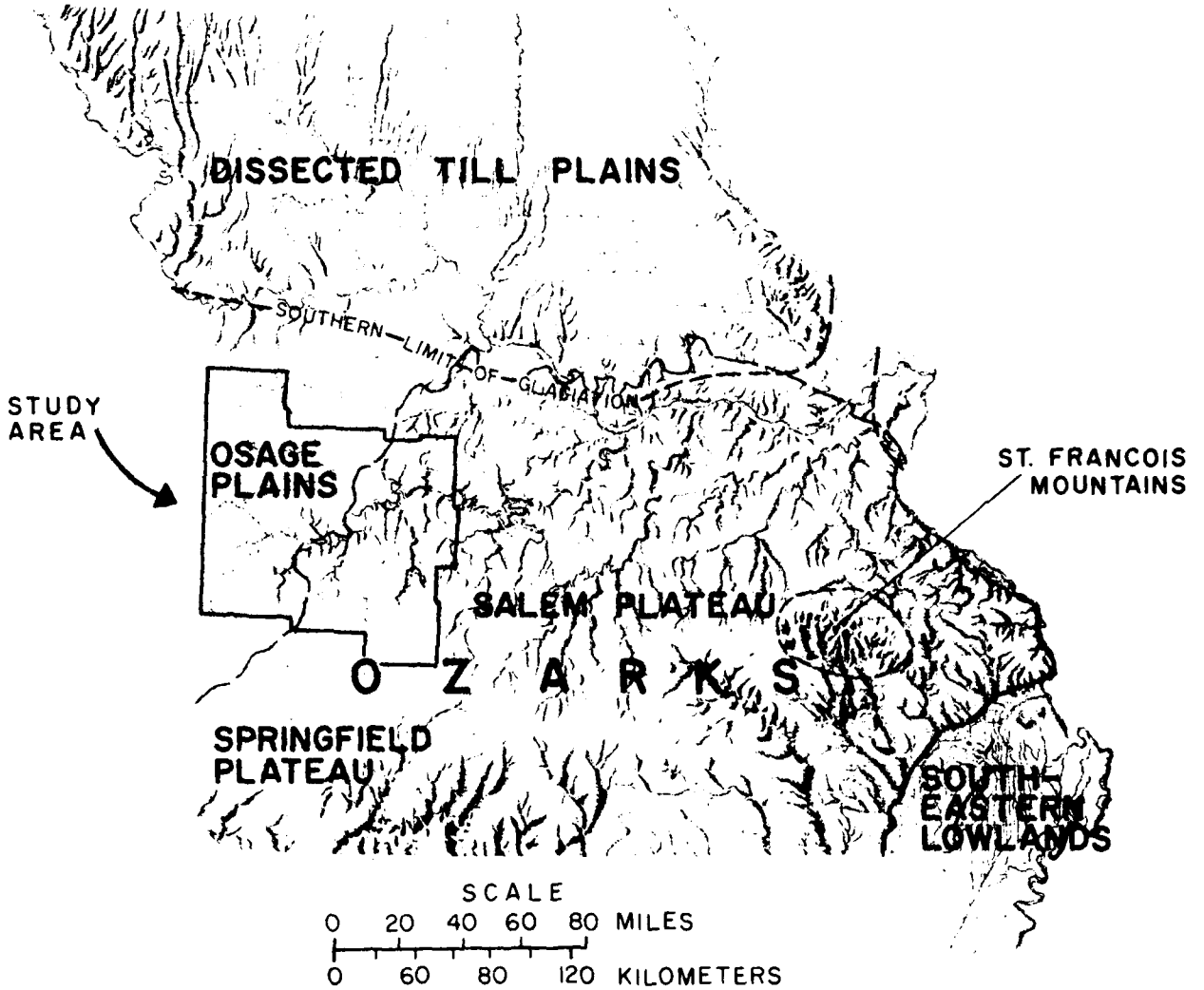

Figure 2. Physiographic map of Missouri, showing the study area (after Vineyard and Feder 1974).

(Cherokee Lowland of McMillan 1976), a subprovince of the Great Plains which includes the area of this report, is underlain by Pennsylvanian-age strata. It is characterized by gently rolling to flat topography with a moderately well developed drainage system.

The bedrock structure of the Osage Plains is characterized by west-northwestward dipping strata, becoming progressively older eastward. This contrasts with the Ozark Plateaus province, which is underlain by strata which dip south-southwest, south of Lake of the Ozarks, and north-northeast north of the Lake. The structural pattern is a result of a structural high, the long axis of which trends northwest-southeast, roughly along the long axis of the Lake of the Ozarks. Local deviations in structure are to be expected throughout the area.

BEDROCK GEOLOGY

Within the Truman Reservoir area (Fig. 3), the bedrock formations comprise four major rock types. These are (oldest first):

a. Dolomite, sandstone, and sandy, cherty dolomite (Ordovician rocks);
b. Limestone and cherty limestone (Mississippian rocks);
c. Shale and sandstone, with minor limestone and economically important coal (lower part of Pennsylvanian rocks); and
d. Alternating shale and limestone, with minor sandstone (upper part of Pennsylvanian rocks).

The bedrock geologic map of the region (Fig. 3) depicts the distribution of these four basic rock types.

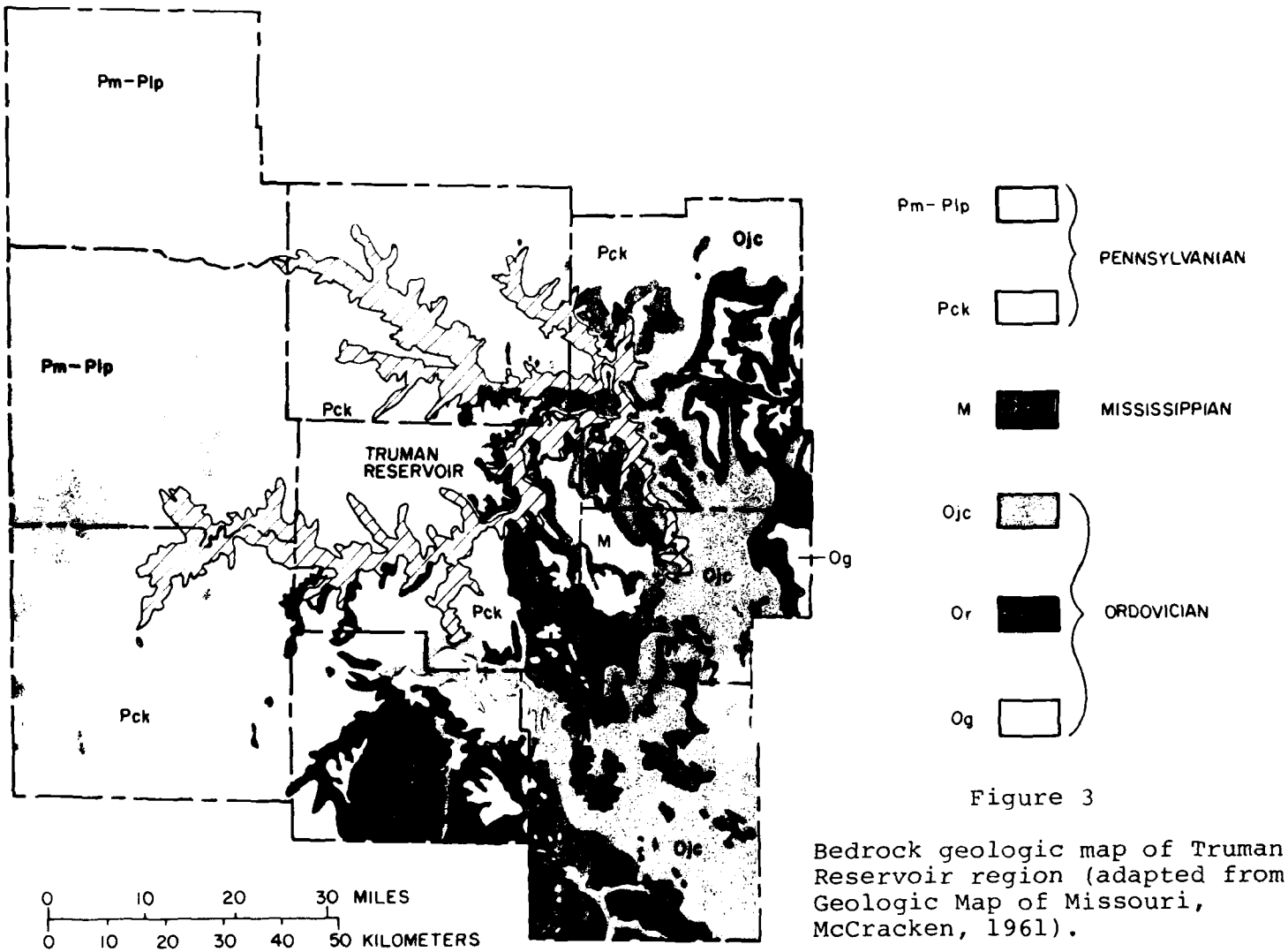

Figure 3

Bedrock geologic map of Truman Reservoir region (adapted from Geologic Map of Missouri, McCracken, 1961).

Each type has distinct physical attributes, and their identification is important to understanding the geologic setting of the Truman Reservoir area.

Ordovician System

The oldest rocks exposed in the Truman Reservoir region are those of the Ordovician System; they are divided by specific rock types into three distinct formations. The topography of the region is underlain by Ordovician strata and is generally quite rugged, particularly near the major rivers and their tributaries. However, some of the divides are broad and relatively flat, especially toward the southeastern part of the region.

The three rock formations identified are, from oldest (lowest) upward: Gasconade Dolomite (Og), Roubidoux Formation (Or), and Jefferson City-Cotter Dolomites (Ojc). They all contain brown to buff dolomite and cherty dolomite (dolomite is a high magnesium, low calcium carbonate), but differ in the amount of quartz sand present either as beds of sandstone or as free sand grains in dolomite, and in the type and amount of chert (commonly known as flint).

Gasconade Dolomite - Gasconade Dolomite generally consists of a massive, relatively chert-free upper dolomite and a lower dolomite containing bluish-black banded chert. In some places the Gasconade contains a type of fossil algae that weathers to a hard, porous surface resembling an elongate biscuit. This characteristic is particularly well exposed in road cuts near Bagnell Dam, east of the Truman Reservoir area. The Gasconade Dolomite ranges from 75 to over 90 meters in thickness in the area of concern.

Although the Gasconade is generally essentially free of quartz sand, in the Lake of the Ozarks region its base is defined by a thick (4.5 to 6 meters), conspicuous quartz sandstone (Gunter Sandstone Member of Gasconade Dolomite) that makes an excellent marker for the lower boundary. The uppermost Gasconade can be sometimes identified by the presence of a distinctive black chert occurring just below the base of the Roubidoux. The upper boundary is identified by the lowest (first) occurrence of quartz sand grains, either free (floating) in the dolomite, or as a sandstone bed, marking the lowest unit of the overlying Roubidoux Formation.

Roubidoux Formation - The Roubidoux Formation is characteristically sandy dolomite and cherty dolomite, usually with one or two beds of quartz sandstone. This unit is an important groundwater aquifer in central Missouri. The Roubidoux is not lithologically consistent, and the percentage of sandstone may vary greatly from place to place; thus, characteristically, the Roubidoux is variable in rock type and is often very cherty, commonly with thick resistant beds of blue-black banded chert, dolomite, and sandstone. The Roubidoux Formation ranges from 30 to over 38 meters in thickness in the Truman Reservoir area.

Jefferson City-Cotter Dolomites - This interval consists primarily of buff to brown, hard to soft dolomite, with some chert and a few beds or lenses of quartz sandstone. Often, some of the upper part may be identified as "Cotter Dolomite," but usually this interval is simply called Jefferson City-Cotter Dolomites, because the distinction between these two formations is generally very difficult to make in the field. The overall thickness of this sequence is 60 to 75 meters in this region.

Mississippian System

In the Truman Reservoir region, there is a thick sequence of limestone (high calcium carbonate) and cherty limestone 90 meters in thickness, comprising strata of the Mississippian System (M). On the geologic map (Fig. 3) the Mississippian System, although subdivided into several formations, is represented by one pattern because of the essentially uniform nature of the sequence. However, two formations are mentioned because of the nature of the chert they contain and its importance to the archeological study of the Pomme de Terre Valley.

The lower part of the Mississippian is combined in a unit called the Chouteau Group (originally named by Swallow in 1855 from Chouteau Springs, Cooper County, Missouri). Chouteau is a name that has been used in various ways, from comprising a "group" of formations in one instance:

Chouteau Limestone
Sedalia Formation
Northview Formation
Compton Formation

to just identifying only the uppermost formation of the above sequence. In the Truman Reservoir area the upper part of the Chouteau Group (Chouteau Limestone in the restricted use) is dolomitic and contains a distinct blue-black nodular chert, with prominent white rinds, that was used for flint tools in the past. The lower unit of the Chouteau Group (called Compton Formation in southwestern Missouri; Thompson and Fellows 1970) is a high calcium limestone. Chert is generally restricted to the upper part of the Chouteau Group, or to the "Chouteau Limestone."

Above the Chouteau is a thick sequence of high calcium, fossiliferous limestone containing gray to white nodular beds of fossiliferous chert separated by 3 to 9 meters of chert-free limestone. This limestone, generally called the Burlington Limestone (named from Burlington, Iowa), is widespread, and is very distinctive not only because of its rich fossil content (often over 90 percent fossil debris), but also because of its high calcium content and its value as quarry stone. Above the Burlington is a continuing sequence of limestone, less fossiliferous, but still high in calcium.

Collectively, the Mississippian strata are over 60 meters thick, but this may vary depending on how much was removed by erosion prior to deposition of the overlying Pennsylvanian strata.

Pennsylvanian System

A period of erosion over most of Missouri followed deposition of Mississippian sediments and preceded deposition of Pennsylvanian strata, during which much of the Mississippian section was removed. While the limestone was being removed by solution, most of the more resistant chert remained behind (sometimes rounded) to be redeposited as a congolomerate or breccia of Mississippian chert on the weathered limestone surface. In west-central Missouri this conglomerate (sometimes called "Graydon") is of variable thickness, and can be seen north of umansville in road cuts on Missouri Highway 13 (St. Clair County) beneath the thick basal Pennsylvanian sandstone.

The Pennsylvanian rocks reflect a distinct change

in conditions of deposition from those of the Mississippian. Whereas Mississippian strata are essentially all limestone, representing a stable shallow marine environment, Pennsylvanian rocks are dominantly shale, with some limestone and sandstone, generally representing unstable, cyclic conditions of deposition changing from shallow marine to non-marine (continental) and back to marine. Of special importance in lower Pennsylvanian sediments are several commercially important coal beds. Also, the large volume of "heavy oil" trapped at shallow depths in thick sandstones in the lower part of the Pennsylvanian sequence is a potentially important future economic resource.

Cherokee Group - The lower Pennsylvanian unit (Pck on Fig. 3) consists of sandstone, shale, and coal, with a few limestone beds, comprising the Cherokee Group of the middle Pennsylvanian Desmoinesian Series. Lower Cherokee strata contain several thick sandstone with intervening shale and coal beds. In some areas these sandstones contain petroleum that is very thick and asphalt-like. It has been quarried as an asphalt sand for road construction. If the technology can be developed, this "heavy oil" could possibly be produced as a petroleum product.

Upper Cherokee strata are predominantly shale and coal beds. Coal has been mined in this area for many years, and has been described in detail by Robertson (1971, 1973) and Wedge et al. (1976).

Post-Cherokee Strata - Pennsylvanian strata above the Cherokee Group are basically an alternating sequence of shale and limestone. Several of the limestones are thick enough to be quarried, and one (Blackjack Creek)

has been quarried in Kansas as a natural "cement rock." The upper Pennsylvanian strata are predominantly shale, but limestone is of greater importance than in the Cherokee; little coal (except for the Summit and Mulberry) of mineable quantity is present in this area. This upper unit (Pm-Plp on Fig. 3) consists of strata comprising the Marmaton Group of the Desmoinesian Series, and the Pleasanton, Kansas City, Lansing, and Pedee Groups of the Missourian Series.

SURFICIAL GEOLOGY

General Discussion

The fragmental, unconsolidated or semiconsolidated materials lying on and above bedrock comprise the surficial materials. Thickness of these materials varies, being very thin in some areas where erosion has kept pace with rock weathering, but reaching several meters where there has been redeposition and/or in situ accumulation of rock debris. The nature of in situ accumulation of weathered rock is largely a function of bedrock composition, whereas materials redeposited by water or wind have no relationship with the bedrock upon which they rest. Weathering of rocks is induced primarily by the chemical reactions of water and air with mineral grains. Such reactions are facilitated where rock is fractured, increasing the surface area exposed to water and air. Extensive vertical fractures are common to practically all consolidated rocks, and many smaller fractures are produced near the surface by frost action and wedging by plant roots. Decomposing plant debris acidifies

percolating water, which greatly increases its capacity to corrode and weather rocks.

Carbonate rocks, limestones and dolomites, which are particularly susceptible to solution, dominate the southeastern half of the area (Fig. 3). These carbonate rocks of Mississippian and Ordovician age are slowly dissolved by groundwater, both at the bedrock surface and at depth. This results in the development of subsurface drainage nets. Calcium and magnesium bicarbonate are removed in solution, facilitated by the appreciable topographic relief which makes for generally higher groundwater flow rates near the surface. Particles of clay, grains of sand, and nodules of chert are far less soluble than the enclosing carbonate rock and thus accumulate at the bedrock surface as a residue (residuum).

The northwestern half of the area (Fig. 3) is underlain by shale, clay or sandstone (Pck), and by shale and limestone farther northwest. In these areas, bedrock is not subject to solution and subsurface drainage (excluding the carbonate portion). Thus, surface runoff is greater and residual materials are thin. Bedrock topography in such areas more closely parallels the land surface and lacks the major irregularities found in many parts of carbonate-rock terrains.

Gravity and slope wash cause residual materials to slowly creep downslope on hillsides, forming colluvium that is in slow transit to valley bottoms. In general, surficial materials are thinner on slopes than on adjacent topographic highs and lows but absolute thicknesses are controlled by a number of factors and are difficult to correlate with topography, bedrock geology, or any other single factor. Colluvium merges with alluvium at

the base of the slope. Alluvium is unconsolidated material that has been transported and sorted by stream-flow. By the sorting action of running water, alluvium is segregated into more or less distinct gravel, sand, and silt-clay deposits.

Where alluvial deposits within the various valleys represent former higher stream levels, such deposits are referred to as terraces. Their development has been studied in detail along the Pomme de Terre River by C. Vance Haynes (in Wood and McMillan 1976). The types of materials comprising the terrace deposits are often variable, ranging in size from clay to gravel, and various combinations.

Major influences on the surficial material development in the area were brought on by changing Quaternary climates over the last two million years of geologic history. While the Truman Reservoir area was south of the southernmost glacial advance, it did not escape the influence of the last glacial retreat to the north. Winds picked up silt and clay from the sediment-choked valleys of the major rivers and redeposited this material as a broad blanket on upland areas over most of the state. Such wind-deposited sediment (loess) is thickest along the Missouri River, thinning rapidly away from its valley. Loess deposited over residual material in the northern half of Cass County averages more than 1.5 meters in thickness. The remainder of the area to the south is covered by a thinner loess deposit, thinning from north to south.

Surficial Deposits Map

Area I. Bedrock underlying this area is composed

chiefly of interlayered shales and limestones. Surficial material (Fig. 4) covering the limestone-shale sequence averages 3 to 4 meters, but typically is thinner on limestone outcrops. Compositionally, the material formed over limestone is moderately permeable clay that may contain chert fragments. The steeper slopes in the area are underlain by limestones having surficial material cover of 0 to 3 meters. Silt-size materials dominate the upper portion of the sequence, reflecting the windblown silt influence.

Area II. Much of Area II is overlain by thick deposits of sand and clayey-sand materials derived from the weathering of sandstone and shale bedrock. These materials combine to form a moderately permeable overburden. The cover thickness ranges from 2.5 to 6 meters on the upland areas. Steeper slopes in the area may have a relatively thin sandy cover, grading to thick deposits of sand and sandy clay along river bottoms.

Area III. This area is characterized by a thin surficial material cover (1.5 to 3 meters thick) developed over silty shale and thin sandstone. Locally, the deposits may be 2.5 to 4.5 meters in thickness, depending on the degree of slope. Generally, the surficial material is silty on the uplands and more clay-rich in the low areas.

Area IV. The unconsolidated cover in this area ranges up to 3 meters or more in thickness. The combination of weathered sandstone, clay and shale produces a relatively plastic and impermeable material. The area is of relatively low relief, which is partially related to the underlying soft shale beds. Unconsolidated materials tend to be thin over sandstone beds.

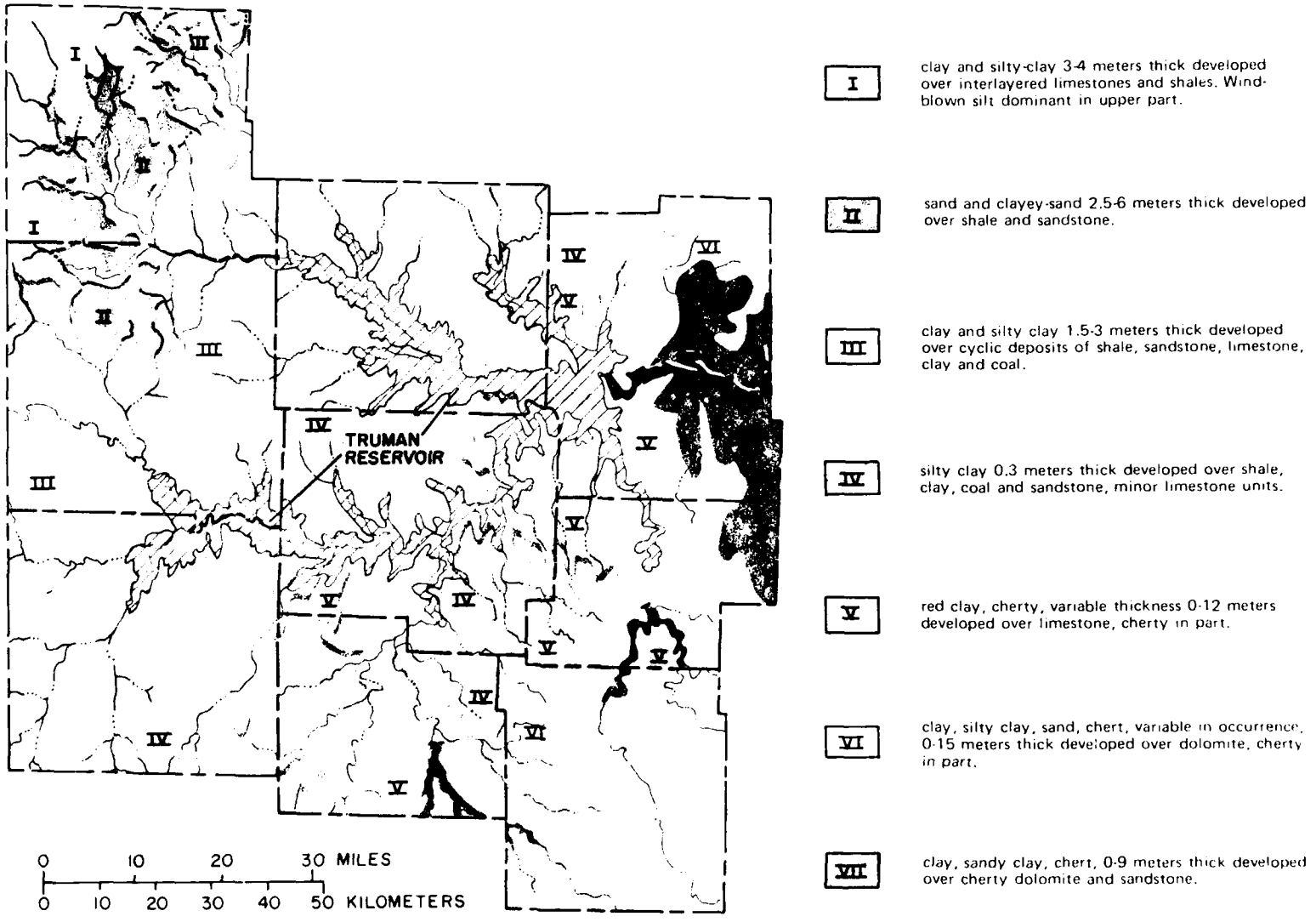

FIGURE-4

Surficial deposits map of Truman Reservoir area (adapted from Missouri Geological Survey and Water Resources, "South Grand-Osage river basin in Missouri" - in U.S. Dept. of Agri. Report, 1970).

Area V. This area is underlain by partially cherty limestone, with some siltstone in the southern part of the area. A moderately permeable red clay deposit has developed over the limestone, varying in thickness from 0 to 12 meters or more. This bedrock surface is very uneven in the southern area. Solution of bedrock along joints or factures has caused pinnacling of the bedrock surface in some areas.

Area VI. Surficial material thicknesses vary considerably in this area. The high ridges and steeper bluffs may have no soil or a thin glade soil, while gentle slopes and valleys may have 3 to 15 meters or more of tan silty clay and chert gravel. Highly permeable, sandy, silty clay, and chert gravel alluvium are prevalent in the deeply eroded valley bottoms. Surficial materials, depending on whether they are on the ridge tops, valley walls or valley bottoms, vary from a plastic clay to a non-plastic deposit of sand and gravel.

Area VII. This area is characterized by a generally thick, permeable, and very stony residual material cover. Residual clay and chert gravel derived from the Roubidoux Formation allow rapid percolation of surface water into the underlying Gasconade Dolomite. The surficial materials vary from 0 to 9 meters or more in thickness, and the materials are characteristically very high in chert content.

SUMMARY

The nine-county area affected by the Harry S. Truman Reservoir is variable geologically. The easternmost region is underlain by the oldest strata, of Ordovician

age, dominated by dolomites and sandstones. A generally thick deposit of surficial material comprised of clay, sand, and chert rests on the dolomites and sandstones. These units may be thin or absent adjacent to major stream valleys. Joining the Ordovician-age bedrock along its western edge is strata of Mississippian age. Here limestones and cherts have formed a surficial cover of red clay and chert. The remainder of the area to the west is underlain by younger, Pennsylvanian-age strata. The surficial material covering the area is relatively thin and dominated by clays and silts, and relief is low with gently rolling topography.

The geology of the Truman Reservoir area is by no means isolated from the other scientific disciplines whose reports follow. A good example can be found in the report on vegetational patterns where a correlation exists between the geology and the various types of vegetation covering the area today. Knowing the geology of a given area is also important in understanding the types of vegetation that have existed in the past. Similarly, the geologist often uses the vegetation as an aid in the geologic mapping of a given area. For example, pines prefer sandy soils normally derived from sandstone bedrock, suggesting to the geologist that a given area is underlain by sandstone.

GLOSSARY

ALLUVIUM. Fragmental sediment (clay, silt, sand, gravel) which has been transported and sorted by a stream.

BEDROCK. A general term for the rock, usually solid, that underlies soil or other unconsolidated, surficial material.

CHERT. A siliceous rock found as nodules and beds within limestone or dolomite; also called "flint."

COLLUVIUM. Surficial materials which creep down slopes; particularly, accumulations of such materials at the base of slopes.

CYCLIC ROCKS. Strata characterized by repetitive alternation of different rock types, such as shale, limestone, and sandstone.

DOLOMITE. A sedimentary rock composed largely of calcium-magnesium carbonate, commonly containing considerable chert.

ESCARPMENT. A long, more or less continuous cliff or relatively steep slope facing in one general direction, breaking the general continuity of the land by separating two level or gently sloping surfaces, and produced by erosion or by faulting.

FRACTURE. A general term for any break in a rock, whether or not it causes displacement, due to mechanical failure by stress.

GROUNDWATER. Water within the earth, both in unconsolidated surficial materials and in bedrock.

HEAVY OIL. Crude oil that has a low Baumé gravity or A.P.I. gravity.

LIMESTONE. A sedimentary rock composed largely of calcium carbonate, commonly containing considerable chert.

LOESS. Silt and clay deposited by winds on uplands during the latter part of the Pleistocene Epoch.

MISSISSIPPIAN. The period of geologic time following the Devonian Period and preceding the Pennsylvanian Period.

ORDOVICIAN. The period of geologic time following the Cambrian Period and preceding the Silurian Period.

QUARTZ. Crystalline silica, an important rock-forming mineral: SiO_2.

RELIEF. The vertical difference in elevation between the hilltops or mountain summits and the lowlands or valleys of a given region.

RESIDUUM. Fragmental residue of rock weathering left more or less in place as other material is removed; particularly, such residue above soluble carbonate rocks.

ROCK. A consolidated or semiconsolidated material of the earth's crust composed of one or more minerals.

SANDSTONE. A sedimentary rock composed of sand grains.

SHALE. A fine-grained, slabby, relatively soft sedimentary rock, consisting of a variety of minerals; sometimes mistakenly called "slate."

STRATA. Beds or layers of sedimentary materials.

STRUCTURE. The relative arrangement of more or less distinct segments of the earth's crust on either a large or small scale; also, any segment separately, such as an uplift or basin.

SURFICIAL DEPOSITS. Unconsolidated and residual, alluvial, or glacial deposits lying on bedrock or

occurring on or near Earth's surface; it is generally unstratified and represents the most recent of geologic deposits.

TOPOGRAPHY. The configuration of the surface of the land.

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PART II

REPORT ON GEOCHRONOLOGICAL INVESTIGATIONS IN THE HARRY S. TRUMAN RESERVOIR AREA BENTON AND HICKORY COUNTIES, MISSOURI

by

C. Vance Haynes

INTRODUCTION

Since completing a preliminary report on the late Quaternary geology of the Pomme de Terre River valley in the Harry S. Truman Reservoir area (Haynes 1976), geochronological investigations have continued with the support of the U. S. Army Corps of Engineers. A Quaternary geologic map of part of the lower reaches of the Pomme de Terre River (Fig. 1) has been completed in preliminary form and revised on the basis of investigations in the field during 1975 and 1976. Detailed stratigraphic cross sections of the ancient meander bend in the Breshears Bottoms and alluvial terraces of the Pomme de Terre River have also been made from nearly 400 meters of backhoe trenches. These studies were augmented by soil core sampling provided by the Missouri Geological Survey and by soil studies conducted by Dr. Donald L. Johnson and by Michael Miller of the University of Illinois, Urbana-Champaign.

In addition, detailed stratigraphic and geochronologic studies of Jones Spring, begun in 1973, were continued. A series of cross sections through the ancient

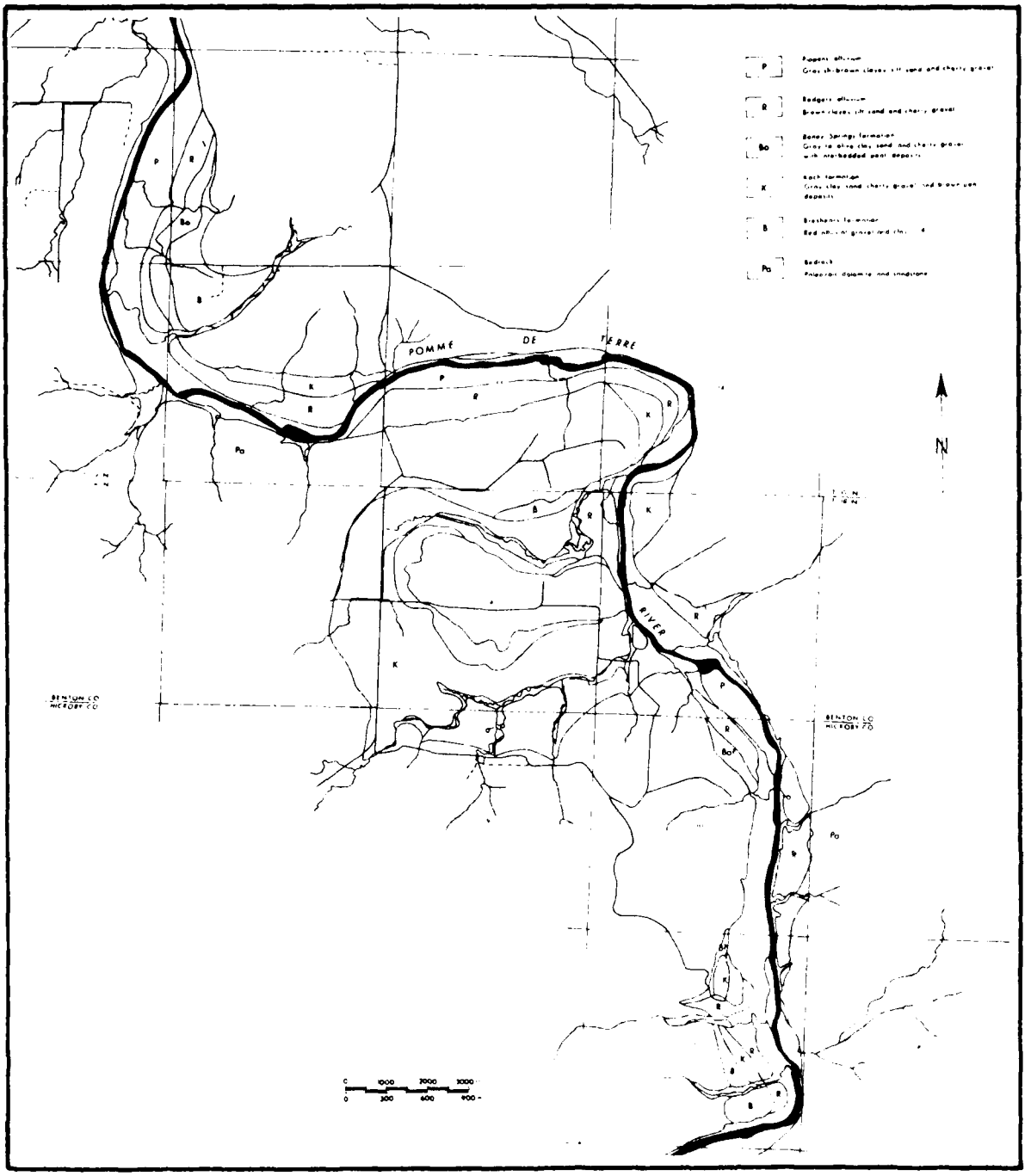

Figure 1. Surficial geologic map of the Breshears Valley, Benton-Hickory counties, Missouri.

spring provide a precise micro-stratigraphic framework showing the complex developmental history of the sediments and their contents of Pleistocene vertebrates, insects, and plants.

Sedimentological studies of the alluvial units are underway in order to better understand the environments of deposition, and studies of the interaction of alluvium and colluvium as a function of time are being done to evaluate the effects of changing climate on these processes.

ALLUVIAL TERRACES

All of the Quaternary deposits of the Pomme de Terre River valley consist of alluvium and colluvium in the form of terraces along the main stream and its tributaries. In addition to the three terraces reported earlier (Haynes 1976) a fourth terrace (T-3) has been recognized and mapped (Fig. 2).

The oldest Quaternary deposits recognized so far in the area are relatively thin (about 1 meter) layers of stream-rounded, tan colored chert gravels that occur on the higher, relatively flat surfaces of the Paleozoic carbonate bedrock. These are apparently gravel straths developed during dissection of the Ozark Plateaus. They could therefore be considered as higher terrace levels, but until they are studied in more detail they will be referred to simply as the "older strath gravels."

Trench 76-A was cut in terrace T-1b approximately 50 meters west of Rodgers Shelter and exposed Rodgers alluvium to a depth of 3.5 meters (Fig. 3). The trench reveals the interbedding of colluvium with alluvium and

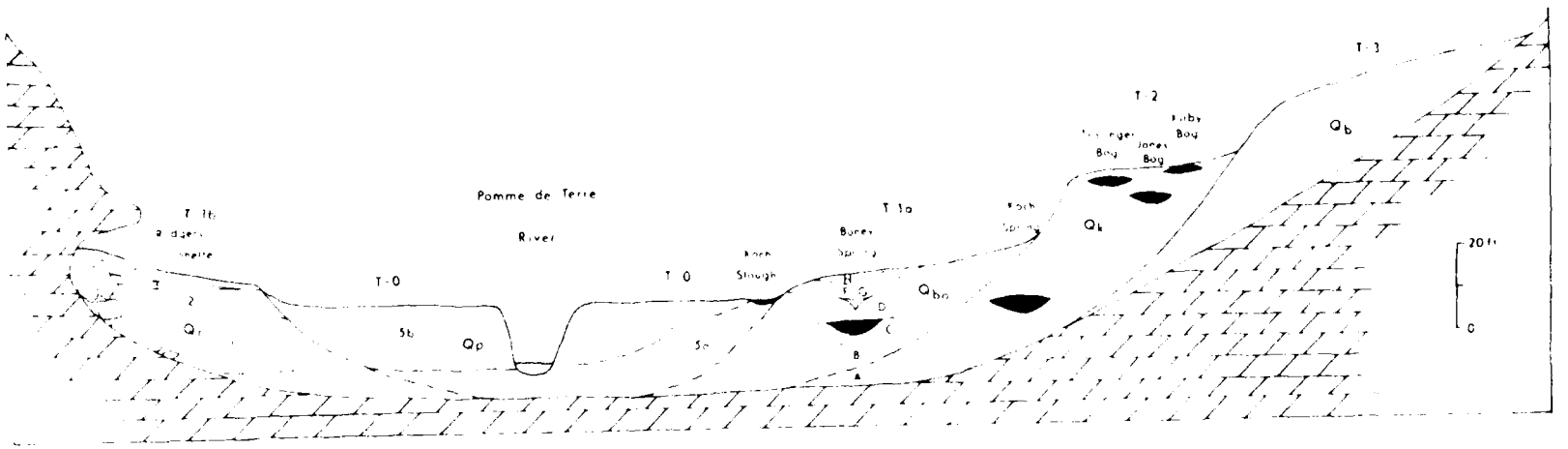

Figure 2. Diagrammatic cross section showing probable stratigraphic relationship of alluvial terraces and peat deposits (no horizontal scale).

cultural debris between 10,000 and 5,000 BP. A buried paleosol correlates in part with Stratum 2 at Rodgers Shelter.

Two east-west backhoe trenches were placed across the western part of Breshears Bottom in order to examine the stratigraphy of the abandoned incised meander. Trench 76-B exposed the Koch formation, showed interfingering with colluvial facies, and revealed paleosol facies developed on the formation. In low areas the Koch formation (T-2) consists of gray, yellowish brown, and olive clay with interbedded lenses of sub-rounded, chert-pebble gravel and a basal chert-pebble gravel. The trench revealed a transition up slope to reddish-brown clayey silt and silty clay with interbedded chert-pebble gravel. Adjacent to the bedrock hillside of the outer meander loop this is overlain by dark gray to black, angular chert-pebble to cobble colluvium.

Eastward, colluvial facies of the Koch formation overlap a reddish-brown, sub-rounded, chert-pebble gravel that forms a strath of T-3. These strath gravels contain a well-developed red paleosol with a fragipan and may represent point-bar deposits of the stream that incised the meander. The T-3 gravels rest in part over residual red clay with interbedded chert lenses. In places, rotten bedrock consists of sand made up of subhedral to euhedral dolomite rhombs.

Trench 76-D, a north-south backhoe trench in T-1b across from Rodgers Shelter, exposed Rodgers alluvium and colluvial facies of interbedded chert and rotten dolomite gravel with reddish-brown, clayey silt. A weak cut-and-fill contact was observed at Rodgers in the northern part of the trench. Charcoal was collected from

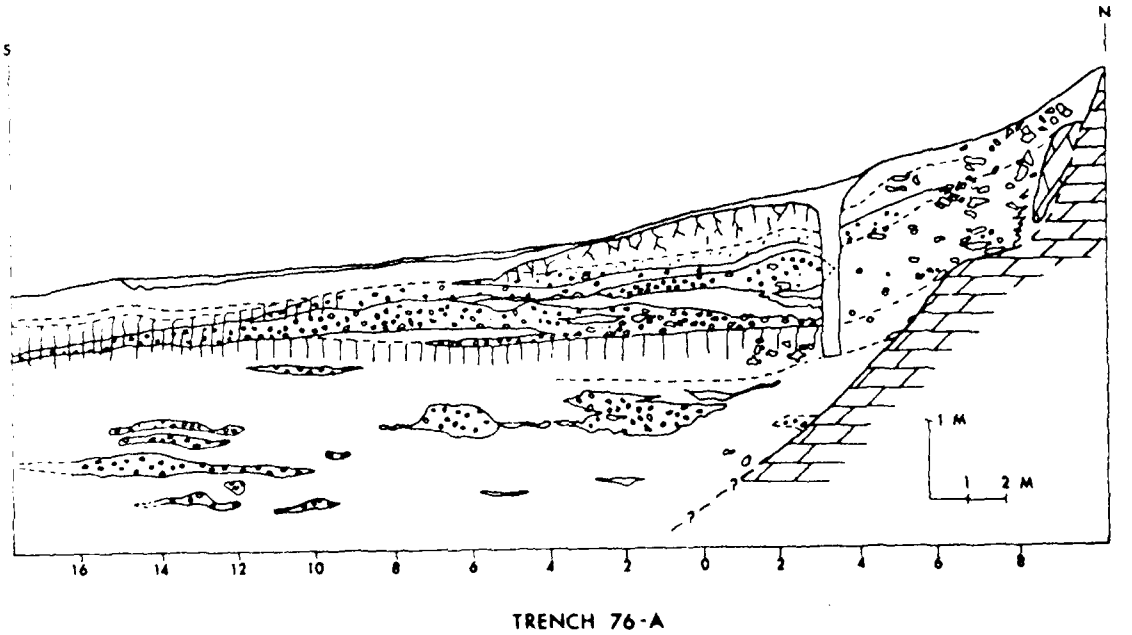

Figure 3. Trench 76-A, cut in terrace T-1b about 50 meters west of Rodgers Shelter.

both sides of the contact in the Rodgers alluvium, and layers of leaf litter were collected from a backswamp deposit in Pippins alluvium. These samples should provide reliable radiocarbon dates.

Two relatively short east-west trenches, 76-E and 76-F, were placed in Rodgers alluvium north of the spring at Phillips Ford to re-examine the stratigraphy, collect additional radiocarbon samples, and see if a cut-and-fill contact had been missed in our earlier excavations. These revealed that no significant contacts had been overlooked and that there were two concentrations of charcoal and artifacts in lenses that merged eastward (Fig. 4). Both charcoal and pollen samples were collected and plotted on the sections. In Figure 4 a section from the 1973 exploratory trench (Trench 73-A) is included for comparison and to show the stratigraphic position of the radiocarbon dates.

SPRING DEPOSITS

Since the beginning of scientific excavations in Jones Spring in 1973, a sequence of cross sections have been maintained showing the micro-stratigraphy of the vertical walls of the excavations. These profiles reveal a complex stratigraphic sequence of peat formation, intrusion of sandy gravels, spring discharge, more peat formation, and subsequent burial by clay. The occurrence of mixed sand and chert gravel (in some places with clay and patches of peat) intruding the lower peat lens, and the occurrence of micro-thrust faults in the peat, indicates that eruptive discharge occurred after a period of more gentle discharge that produced the lower peat.

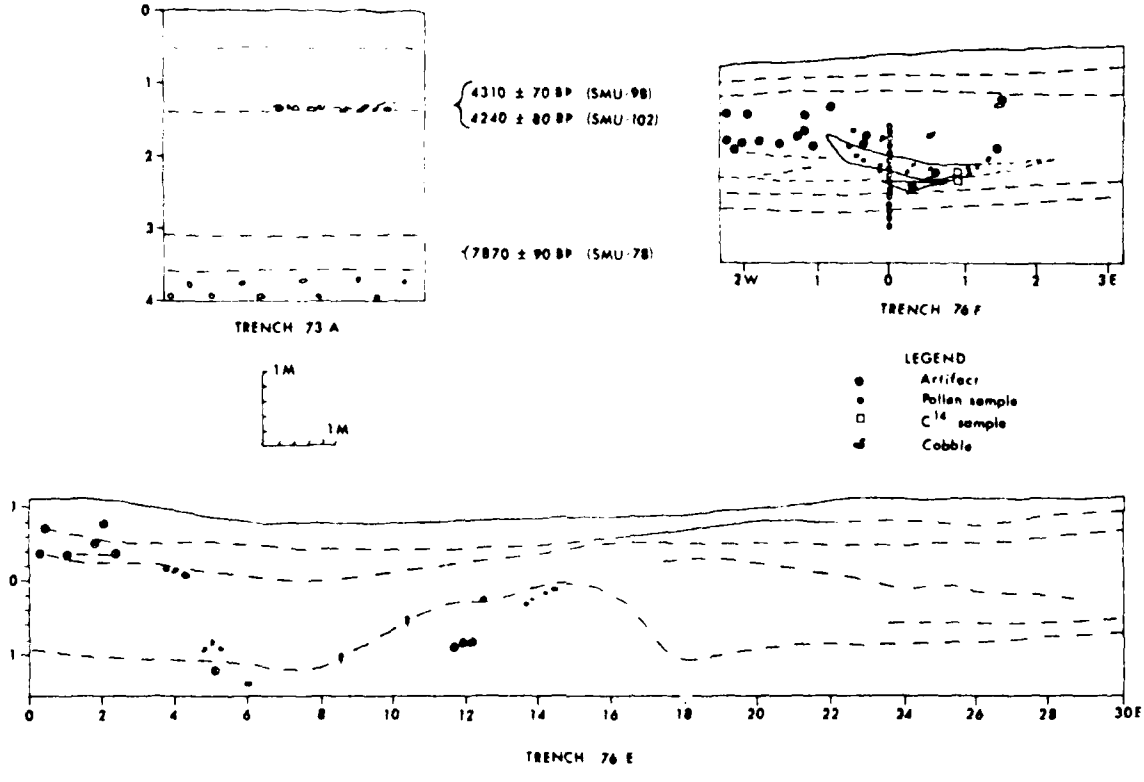

Figure 4. Cross sections of the stratigraphy at Phillips Spring.

The indicated chain of events suggests reactivation of a fault in the bedrock.

Numerous bones of extinct vertebrates have been recovered from these deposits, and the stratigraphic position of most of the specimens is known within this detailed framework. Faunas are known from both the lower peat and the upper peat, and numerous specimens have been recovered from the intrusive gravels and the feeder sands. Because of the indicated mechanism of emplacement of the gravels it is quite likely that at least some of the bones and organic matter have been reworked from lower levels and incorporated into the gravels, feeder sands, and upper peat. These problems can be better assessed if and when the lower parts of the spring deposits are examined.

RECOMMENDATIONS

Future geological work in the reservoir area should include the excavation of at least three more relatively long stratigraphic backhoe trenches to clarify the mapping, augment the geochronological sequence, and determine the paleoclimatic relations of alluvial-colluvial interaction. These should be placed across the terraces on the east side of the Pomme de Terre River south of Boney Spring, across the meander bend on the west side of the river opposite Buzzard Bluff, and on the east side of the river south of Buzzard Bluff or on the west side of the river south of Koch Spring. In addition, several shorter test trenches should be made at critical places to verify the mapping. Some of these should be across tributary valleys.

At the spring sites of Boney, Trolinger, Jones, and Phillips a major effort should be made to ascertain the lower, as yet unexposed, stratigraphy, and recover valuable faunal and floral remains before the area is inundated. More work is now being done in these springs, and further excavations are being planned.

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PART III

SPATIAL AND TEMPORAL DISTRIBUTION OF PLANT RESOURCES IN THE HARRY S. TRUMAN RESERVOIR

by

Frances B. King

INTRODUCTION

The Truman Reservoir lies within the broad transitional area between the tall grass prairie (Andropogon-Panicum-Sorghastrum) and the oak-hickory forest (Quercus-Carya). The eastern part of the reservoir is characterized by rolling to hilly topography and widespread forest, while the flatter western portion is prairie covered, with forest restricted to stream margins and valleys. The vegetation of the reservoir area is determined by the interaction between climatic factors (principally precipitation) and geology (topography, bedrock, and soils) Braun 1950, King 1973, Kucera 1961, Küchler 1964, McMillan 1976).

Unlike the transition between two forest types, which is generally gradual with an intermingling of the trees of the different types, the ecotone between two dissimilar communities such as forest and prairie is usually relatively abrupt. The two communities often alternate in a mosaic pattern established by local micro-environmental factors, with only a narrow ecotone (Carpenter 1940, Küchler 1974). It is this interdigitating pattern that exists in the Truman Reservoir, where the uplands were,

prior to Euroamerican settlement, often covered by prairie and the forest restricted to the dissected topography along the rivers and streams.

CLIMATE

In a distinctly prairie climate, the seasonal distribution of rainfall and total annual accumulation are favorable to the growth of grasses and other species adapted to drought during the normal growing season, while other factors such as fire or soil conditions are relatively unimportant (Curtis 1959, Transeau 1935). Tree growth in a prairie climate is also generally limited to slopes and other protected areas where the dessicating effect of sun and wind are minimized and, in the past especially, some protection afforded from prairie fires.

In contrast, the effects of edaphic differences and fire become increasingly important in determining the vegetation as an ecotone is approached, where either forest or prairie might exist equally well. In a true "forest" climate with abundant moisture favorably distributed throughout the growing season, fire and edaphic factors are again unimportant except possibly as a modifying factor in forest composition (Curtis 1959).

Presently, the Truman Reservoir lies within the prairie-forest transition zone and its vegetation is therefore more likely to be influenced by non-climatic factors than is the tall grass prairie to the west or the deciduous forest farther east. However, in the past the climate has oscillated between conditions more favorable to prairie and to forest development. During drier

periods, climate probably has had an overwhelming fluence on the vegetation of the reservoir area. However, during wetter periods the non-climatic factors, chiefly geology and fire, become increasingly influential in determining vegetation composition and distribution.

GEOLOGY

The eastern part of the Truman Reservoir lies within the moderately dissected Salem Plateau, with steep relief along the Pomme de Terre River and its tributaries (Fenneman 1938). The soils of this part of the reservoir area are highly weathered, developed from cherty dolomite, limestone, and sandstone (Scrivner et al. 1966), and the high ridges and steep bluffs may have little or no soil. To the west, the topography is generally flat-lying, with moderately permeable to impermeable prairie soils derived from Pennsylvanian age bedrock. Figure 1 shows the relative distribution of slope classes in areas of the reservoir underlain by different substrata. The Cherokee lowland in the western part of the reservoir has a predominance of flat uplands or gentle slopes; the transitional Springfield Plateau, underlain by Mississippian age Burlington Limestone and Ordovician (Jefferson City) Dolomite, has a somewhat more even distribution of slope classes, still dominated by the gentler slopes, and the Roubidoux Sandstone has a relatively large amount of relief. The substrata are important not only because of the differences in the texture and chemistry of soils derived from the, but also because the topography is produced by differences in erodability, as well as by the type of vegetation cover, which is to a large degree

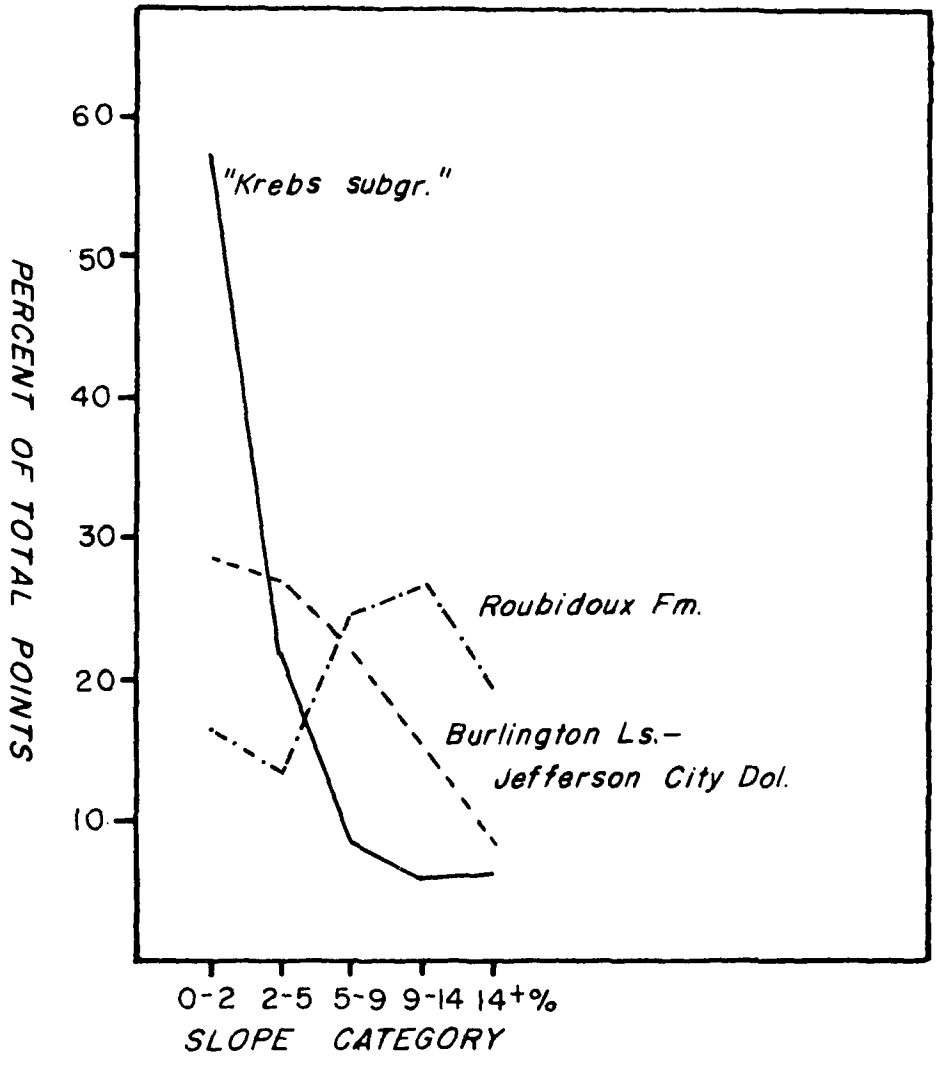

Figure 1. Relative distributions of slope categories by bedrock type, Benton County, Missouri (See Ward and Thompson this volume for description and distribution of bedrock types. "Krebs subgroup" includes the Pennsylvanian deposits).

itself influenced by the topography and soils. Figure 2 shows the relationship between slope and the relative amounts of forest and prairie. Less than 10% of the points with slopes of 0-2% were forested at the time of the General Land Office surveys in the early 1800's, with nearly 100% of slopes greater than 14% forested. Thus, the western half of the reservoir is primarily covered by prairie, while the eastern half is forested either with post oak (Quercus stellata) and Blackjack oak (Quercus marilandica) or white oak (Quercus alba) dominated forests depending on the situation.

Flat-lying areas, because of bedrock composition and/or lack of erosion, frequently have more finely textured soils with a high water retaining capacity in the upper horizons but poor permeability, thus favoring the growth of seasonal prairie plants with fine dense root systems concentrated in the upper levels. In such situations, insufficient water is available at lower depths during the late summer to support the more deeply and coarsely rooted woody species (Daubenmire 1969, Kucera 1961). Slopes, in comparison, tend to have more coarsely textured, rocky soils with greater permeability despite a higher rate of run-off caused by the slope angle. Trees are often able to outcompete grasses on slopes because of more available moisture, resulting from both textural differences, and protection from sun and wind dessication. In addition, erosion is greater on slopes, the dense prairie sod more readily broken, and tree seedlings more likely to become established. Bruner (1931) found in Oklahoma an extensive oak-hickory savanna controlled by the sandy texture of the soil. Less sandy soils were occupied by post oak, blackjack oak, and black hickory (Carya texana).

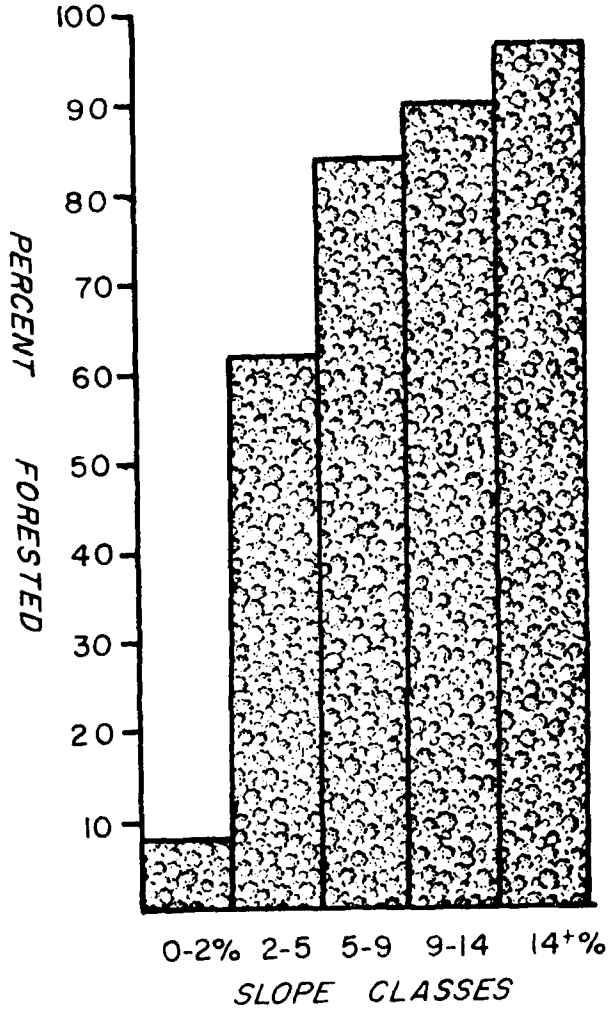

Figure 2. Relationship between slope and percent forest, Benton County, Missouri.

Bedrock geology and soils are also important in the composition and distribution of forest. In the Ozarks region, areas with large amounts of limestone and dolomite are characterized by steep slopes, thin and rocky soil, and frequently, cedar "glades." These open stands, consisting of scattered red cedar and scrubby hardwoods with an undergrowth of grasses, seldom occur on better soils (without disturbance such as overgrazing) since they are readily outcompeted by more mesic species on such sites (Kucera and Martin 1957, Read 1952). Sites with deeper, more fertile, well-drained soil and/or more protected sites support stands dominated by white oak or red oak, while intermediate sites, with thin or poor soil or more exposed sites, tend to be dominated by post oak, black oak, blackjack oak and black hickory. These different types may lie in close proximity to one another, reflecting microenvironmental differences. Regionally, this pattern is shown by the dominance of white oak in the more dissected areas underlain by the Roubidoux sandstone and post oak and sometimes blackjack oak in the flatter, transitional Springfield Plateau region. Upland forest, where it occurs in the western part of the reservoir, is often found on poor sandy soil and is frequently dominated by post oak and blackjack oak similar to what Bruner (1931) found in Oklahoma. A typical notation of the land surveyors in this section of the reservoir was "poor and sandy soil, timber poor blackjack barrens."

FIRE

The disparity between the mosaic of forest and prairie that might be expected in the eastern part of the Truman Reservoir, and the savanna-like "barrens" which actually covered much of the area at the time of Euro-American settlement (McMillan 1976) suggests that factors other than climate and soils are important in shaping the vegetation of this region. Unlike cedar glades, which can be correlated with bedrock geology (Kucera and Martin 1957, Read 1952), the "barrens" mapped from the government land office surveys of the early 1800's show no edaphic or topographic affinity; rather, they occur apparently at random in areas that have, since settlement, grown into dense forest.

Fire appears to be the important additional factor in determining the vegetational history of western Missouri. As in much of the Ozarks, fire-intolerant red cedar (Juniperus virginiana) was almost completely absent from the Truman Reservoir at the time of the government land office surveys, although it is ubiquitous today. (In part, the modern distribution of red cedar has been influenced by man's disturbance of the landscape as well.) The same is true of sugar maple (Acer saccharum), another thin-barked, fire susceptible species which occupies somewhat more mesic sites. At the time of the surveys, red cedar and sugar maple were only recorded on a few protected bluffs, usually on the leeward sides of rivers. Buzzard Cave Bluff, the area east of Rodgers Shelter, is one of the best examples of an area which was covered by red cedar and sugar maple prior to settlement.

Fire has a significant effect on vegetation, and Indians had numerous reasons for augmenting the frequency of naturally occurring fires (Table 1) (Day 1953, Gordon 1969, Vogl 1974). Not the least important reasons are the effects on the composition, density, and species diversity of forest resources. Figure 3 shows the relationship between biomass and species diversity following a fire. Diversity (the number of species present) is highest in an early forest stage when some successional species are still present. Biomass (total amount of vegetation) continues to increase for a long period, but would be expected to level off in a mature forest (Whittaker 1970). Even though total biomass is smaller in a less mature forest, there are more sprouts and shrubs which can be exploited as browse by game animals; in a mature forest, much of the biomass is tied up in non-exploitable wood.

Several modern studies in Missouri advocate the thinning of dense overstories to increase production of deer and turkey food (Murphy and Crawford 1970, Ehrenreich and Crosby 1960), or to promote fruiting of species utilized by squirrels (Murphy and Ehrenreich 1965). Fire would act to increase available food resources in several ways: by killing some trees it would open the canopy and increase nut and fruit production of the remaining ones, by promoting sprouting of stumps of trees burned back to the ground level it would increase browse and the amount of grass and shrub understory. Such understory plants would include both those important as browse species and those of value directly to man.

TABLE 1

Origins of Fire (Vogl 1974)

A. MAN
   1. Expose or flush animals by destroying cover
   2. Concentrate game in remaining good habitat
   3. Maintain maximum productivity
   4. Clear land for agriculture
   5. Select for certain plant species
   6. Stimulate flower, fruit and seed production
   7. Create fertilizing ash
   8. Facilitate harvesting crops
   9. Communication
   10. Increase visibility and mobility
   11. Reduce and repel insects
   12. Minimize attack by enemies and predators
   13. Minimize effect of uncontrolled and warfare fires
   14. Accidental
   15. Increase decay resistance in grasses grown on burned areas (for basketry)

B. LIGHTNING SET

C. SPONTANEOUS COMBUSTION

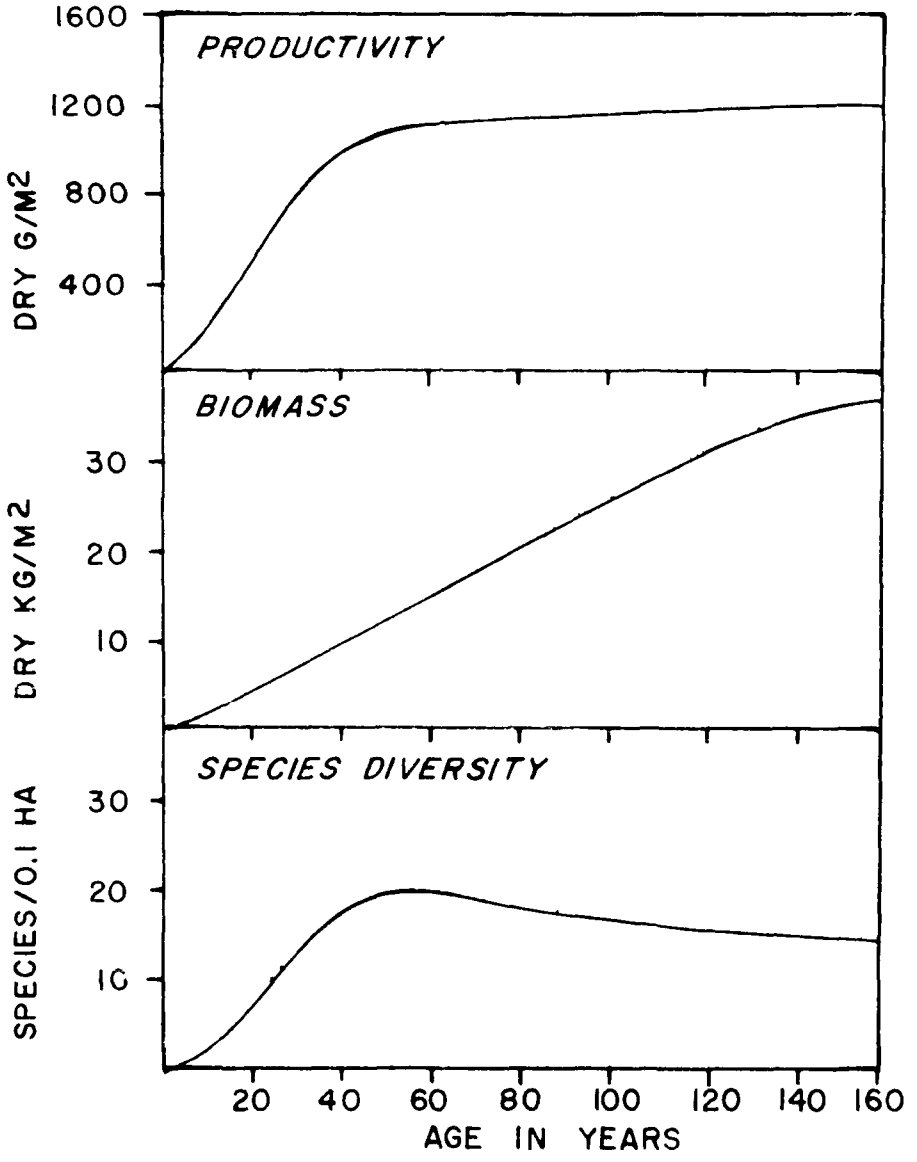

Figure 3. Relationship between net annual productivity, biomass, and species diversity in forest succession following fire in an oak-pine forest (New York). (Adapted from Whittaker 1970)

The number of trees in the Ozarks actually producing nuts or fruits is relatively small today. However, the "barrens" of the early 19th century government land office surveyors were probably comparatively more productive on a per tree basis than many modern denser forests. Figure 4 shows the difference between a rich white oak forest and what would probably have been described by the land surveyors as a "brushy barrens," an area that has been burned by landowners periodically for many years "to make the deer hunting better." The bottomland forests had a density recorded by the surveyors as about 4-8 trees per acre, compared to 60-130 trees/acre in modern stands in the vicinity of Rodgers Shelter. These bottomland forests were probably comparatively rich in both nut and fruit producing trees and in shrubby and herbaceous understory plants, as well as in game being supported by those plants.

PLANT RESOURCES

Most of the Truman Reservoir area at the time of the government land office surveys was covered by upland prairie, with widespread upland forests and barrens only in the eastern half. Slope and bottomland forests occurred along stream valleys, and there were numerous bottomland prairies.

The prairie is relatively unproductive in terms of human food plant resources, with the majority of the species being impalatable grasses. Only 37 of the 206 edible plants listed as occurring in the western Missouri Ozarks occur on the prairie (King 1976). Of these, 12 are important in the lowlands, and 8 in the

a

b

Figure 4. Vegetation examples from Benton County, Missouri. (a) Mature white oak forest, and (b) open brushy frequently burned "barrens."

uplands (Weaver 1954). By far the single most valuable species, although not the most common, is the prairie turnip (Psoralea esculenta), the roots of which were collected in June and July in upland prairies and dried and stored for winter use (Gilmore 1919). The starchy tubers of the Jerusalem artichoke (Helianthus tuberosa) and the hog peanut (Amphicarpa bracteata) are also available in the late summer to early fall. The other edible plants found in the prairie include greens (Silphium, Asclepias, Oxalis, Plantago), fruit (Fragaria, Physalis), and seeds (Helianthus, Artemisia, Sporobolus, Solidago, Panicum, Elymus) with the majority becoming available in the late summer or fall.

The greatest number of potential plant foods occur within or adjacent to the forest, especially in ecotonal or disturbed areas. Although the ecotone between forest and prairie is generally narrow, it still contains representatives from both communities and tends to be more diverse than either community alone, as well as having a much higher animal population than either adjoining community (Carpenter 1940). "Barrens" were probably more similar to ecotonal areas than to open forest in terms of plant diversity and wildlife habitat.

Like all plants, the distribution of specific food plants is determined by various microenvironmental factors, the most important of which is generally the amount of available moisture. Figure 5 shows the distribution of available plant resource species correlated with topography, or the size of the stream in the case of floodplain forest. A relatively high percentage of oaks occur on slopes and uplands; most other food producing plant species become increasingly important with

greater stream size, which is accompanied by greater floodplain width as well as an expanded moisture gradient. Figure 5 shows the distribution of arboreal plant resource species, including sap, fruit, and nut producers. The only group not represented is herbaceous "greens" or potherbs, which comprise the greatest number of species but have relatively little caloric value.

Sap was an extremely important food to many Indian groups, since it became available before other plant resources in the spring. Many tribes travelled to special camps during the sugar season, boilding down the sap into sugar and storing it for use throughout the year (Densmore 1928, Gilmore 1919). Fruit producing plants are widely spread and some are more common in burned or disturbed habitats (blackberries, strawberries, black cherry, persimmon). Walnuts and hickory are more common in the bottomlands and lower slopes, particularly the more desirable species such as pecan (Carya illinoensis) or shellbark hickory (Carya lacinosa). Oaks occur relatively frequently on the uplands, but the best acorns (largest, sweetest) come from Bur oak (Quercus macrocarpa) and white oaks, which are both fairly mesic and most common in the bottoms and on lower slopes.

It must be acknowledged that plants are not the only resource that is important to subsistence. Water at times must have been a limiting resource, and game, fish, mussels, etc. were undoubtedly important. While it is probably accurate to examine the distribution of plant resources in the fall and spring with the intention of predicting settlement patterns: in the fall certain plant foods of high caloric value and preservability are available; in the spring sap is an important

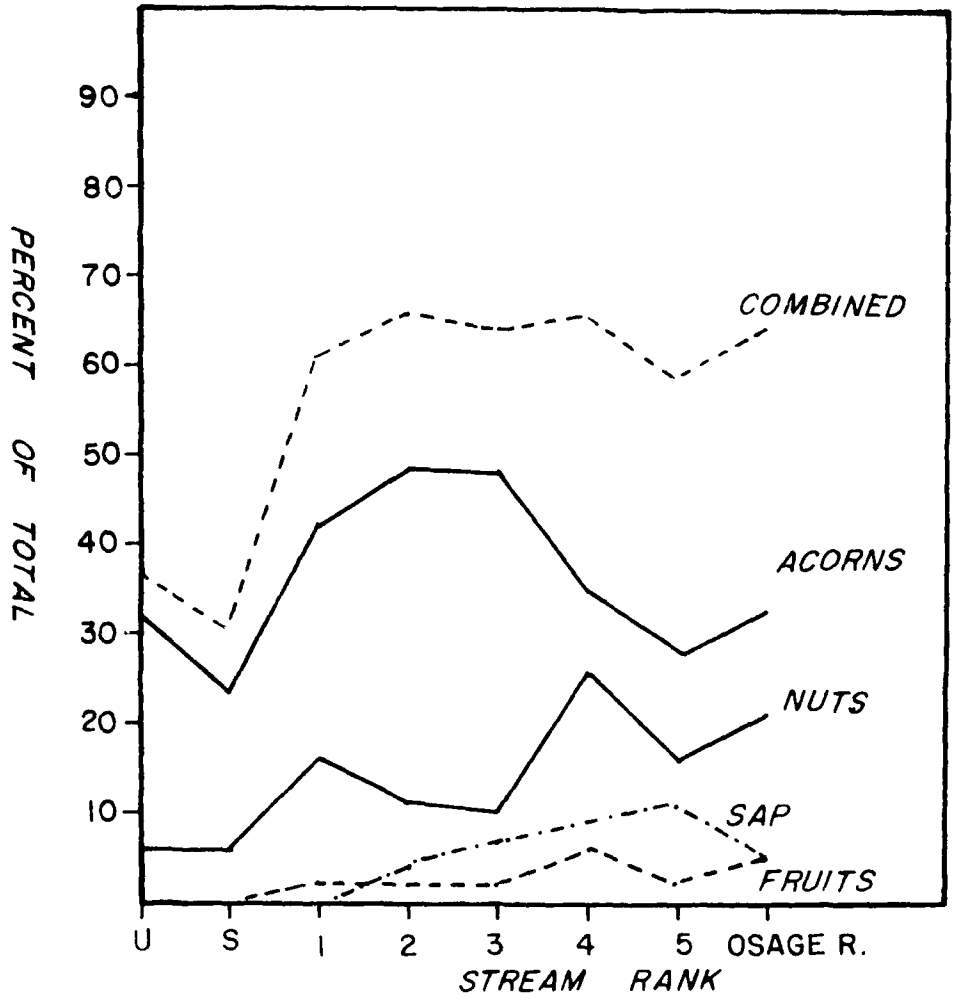

Figure 5. Relative distribution of arboreal food producing types by topographic position (upland forest) and stream rank (bottomland forest), Benton County, Mo.

resource. However, it is probably meaningless to make predictions on the basis of plant resources available during the winter (there basically are none) or the summer, because although plant resources are abundant, game is very likely a more important factor at that time in determining settlement location.

RECONSTRUCTIONS OF PREHISTORIC PLANT RESOURCE DISTRIBUTIONS

The use of the early 19th century government land office surveys to reconstruct pre-Euro-American settlement or original vegetation is an effective method of examining plant distributions at, at least, one point in history. However, the vegetation recorded is much different from that shown by maps of the "potential natural vegetation" (Kuchler 1964, 1967; Rochow 1972, Wuenscher and Valiunas 1967). This difference occurs because the majority of the vegetation recorded by the GLO surveyors was not in a "climax" state, precisely reflecting geological boundaries and contemporary climate. Rather, the vegetation in many places was "sub-climax" because of storm damage or disease-created openings where the forest has returned to an earlier successional stage. Fire may also modify forest composition and structure. The "potential natural vegetation" may itself be changed by climatic oscillations. Thus, while it is possible to describe the potential vegetation of an area for a given set of environmental and climatic parameters, it is much more difficult to reconstruct actual past vegetation since it was affected by

non-predictable, relatively random environmental events such as storms, fire, or even climatic change.

Although climate is relatively uniform across the Truman Reservoir area, it has fluctuated between wetter and/or cooler and hotter and/or drier conditions in the past (King 1973, Wood 1976, Wright 1976), so that it might be expected to have had more, or less, of an ecotonal climate than at present. An ecotonal climate is one which does favor forest or prairie thus making other environmental factors more important. Wright (1976) suggested that the mid-Holocene warming/drying period (Hypsithermal) was characterized by primarily drier conditions than present, possibly accompanied by warmer summer temperatures as were the more recent droughts of the 20th century. King and Allen (1977) show that, on the southern border of the prairie peninsula, conditions were considerably drier and possibly warmer at 7000 BP, with a return to more mesic climatic conditions about 4500 BP. Other evidence suggests that the period preceding the Hypsithermal was different from that which followed it, possibly because of a difference in vegetational composition as more slowly migrating plant species moved into the midwest from the areas they had occupied during the Wisconsin glaciation.

Although there is as yet no Holocene vegetational history of the western Missouri Ozarks, evidence from southeast Missouri shows that they were occupied by some type of deciduous (oak-hickory) forest during the early Holocene (King and Allen, 1977). This forest was probably eradicated from all but the most mesic localities by the ensuing Hypsithermal dry period, with prairie becoming so well established that it was able to prohibit

forest encroachment after the climate had ameliorated. Although fire probably played an important role in the continued absence of trees from many localities, areas such as the "barrens" must have been fairly well denuded of trees during the Hypsithermal, since oaks and hickories rootsprout readily and cannot be eradicated from an area strictly by fire (Curtis 1959).

At the time of Euro-American settlement, many places in the prairie peninsula (including the Truman Reservoir) were showing signs of forest invasion onto the prairie, an event which has been attributed to the relatively moister conditions present during the neoglacial or "little ice age," which ended prior to settlement (Wood 1976). Despite less mesic climatic conditions since then, however, other studies in the Midwest have shown increases in forest mesophycity since settlement and the cessation of prairie fires. In the absence of fire, fire-intolerant species such as sugar maple and red cedar have been assuming greater dominance in the fores composition, despite somewhat less favorable climatic conditions during the last 200 years (Auclair 1976, Auclair and Cottam 1971, Howell and Kucera 1956, Kucera and Martin 1957, Wuenscher and Valiunas 1967).

Floodplains of higher-order streams were probably increasingly less affected by climatic fluctuations of the past, or by burning, than were uplands or gentle slopes or lower rank intermittent streams. An exception might be the terraces occupied by "bottomland prairie." While available moisture at the present could certainly support tree growth in these areas, it is possible that such slightly higher, flat-lying terraces may have dried out sufficiently during the Hypsithermal to eliminate

forest cover and allow prairie to become well established. Forest encroachment may subsequently have been prevented by either outcompetition by dense prairie stands or continued prairie fires. Alternatively, bottomland prairie has also been associated with aboriginal agriculture in some river valleys in the east (Gorden 1969); compared to the uplands, bottomlands are even better for agriculture in western Missouri than further east where there is more precipitation. A third possibility is that prairie has been favored on certain terraces by edaphic conditions.

Vegetation and Settlement Patterns

Comparison of the woody food plants present in the Truman Reservoir with those in the drier regions of eastern and central Kansas (*Fig. 6*) shows a greater diversity in bottomland forest composition. Of the bottomland species occurring in western Missouri, 49% occur in central Kansas, while only 32% and 36% of the species occurring on the slopes and uplands respectively continue to do so.

There are at least three factors of plant resource availability that would argue for an increase in the utilization of bottomland habitat during dry periods: arboreal plant resources are more diverse and plentiful in the bottomland (Figs. 5 and 6); death of trees would occur more slowly and to a lesser degree in the bottoms; and diversity would also decline more slowly. Albertson and Weaver (1945) found that as an aftermath of the drought of the 1930's, losses in the most xeric sites and along intermittent streams were high, while losses

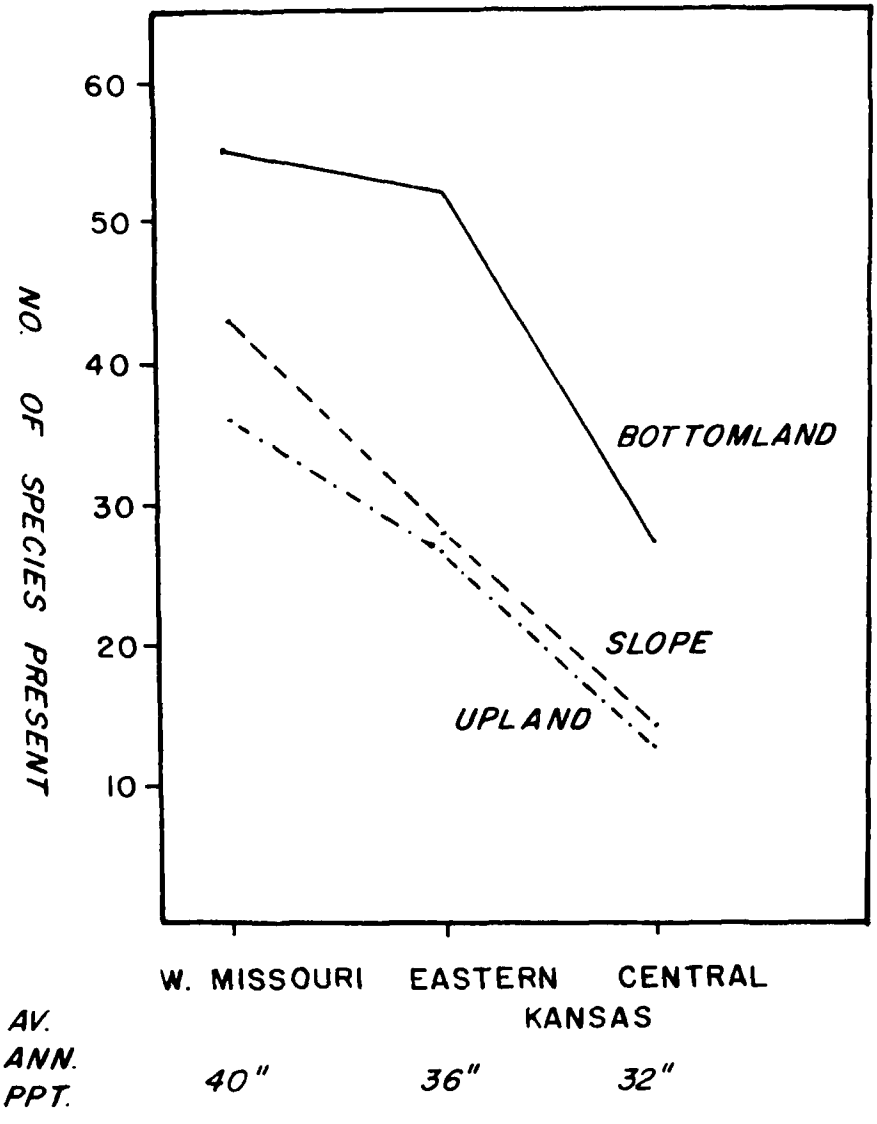

Figure 6. Changes in species diversity in woody food plants in upland, slope, and bottomland forests from western Missouri to central Kansas (based on Stephens 1973).

of trees along perennial streams and continuously flowing springs were much lower. Because both plant and animal resources would probably concentrate in the remaining forest and near dwindling sources of water, it is obvious that floodplain habitats would become increasingly important under drier climate regimes. There would be a concomitant decrease in the exploitation of the uplands except for specific, enduring resources. After the return to more favorable climatic conditions, bottomlands would continue to supply the greatest diversity and volume of plant resources, as well as being the most profitable location for aboriginal agriculture.

It is probable that the spatial and temporal distribution of plant resources that once existed in the Truman Reservoir area will also be reflected by settlement patterns. It can be predicted that Indians would have utilized the upland habitats of the Ozarks to a greater extent during the early Holocene than during the subsequent dry period (Hypsithermal) when the species diversity and forest density of the upland forests declined. With fewer resources available in the uplands, bottomland habitats undoubtedly became increasingly important. Agriculture apparently began in the Ozarks about the time of the return to effectively moister climatic conditions following the Hypsithermal. At that time, bottomland camps would continue to be necessary adjacent to garden plots although they might be occupied for only brief portions of the year. Such a pattern of seasonal occupation of agriculturally oriented base camps was followed by the historic Osage (Chapman 1959).

Undoubtedly, analyses of settlement patterns and archeological testing of sites in the Truman Reservoir

will be as vital to the reconstruction of actual subsistence activities as the reconstruction of resource distributions will be to understanding settlement. All are approaches to a better understanding of man's evolving relationship with his changing environment and all are crucial to gaining a better knowledge of the first approximately 10,000 years of human occupation of the Truman Reservoir.

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PART IV
SOILS AND SOIL-GEOMORPHIC INVESTIGATIONS IN THE LOWER POMME DE TERRE VALLEY, MISSOURI

by

Donald L. Johnson*

INTRODUCTION

Conceptual Framework

Soil is an integral part of all landscapes, as each landscape is "capped" by a soil. Thus the upper few meters of every geomorphic entity, be it a stream terrace, hill, plateau, drumlin or whatever, consists of soil, and one or more buried soils may be present. Such a soil-geomorphic landscape unit is a paleoenvironmental "bank" (a palimpsest) which theoretically contains information traces of many, if not most, Quaternary environmental changes and processes. Many paleoenvironmental traces, however, become blurred with time and may be difficult to read. The goal of a soil-geomorphic study is to attempt to decipher such blurred records, and to gain an understanding of the evolution of the soil-geomorphic landscape.

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*Assisted by M. V. Miller and D. Stegner.

Scope of Proposed Work and Study Area

The present soil-geomorphic study was conceived within this conceptual framework. Work was proposed to provide basic soil-geomorphic information on the alluvial-colluvial fill and adjacent bedrock areas of a selected portion of the lower Pomme de Terre River, Hickory-Benton counties, Missouri (see accompanying map in envelope). The study encompasses an area in which several of the most important archeological and paleontological sites in North America occur, sites with long records of prehistoric climate, plants, animals and humans (Wood and McMillan 1976). The soil-geomorphologic work done supplements and complements the paleontologic, archeologic, and geologic work, and provides meaningful insights into the late Quaternary environment and the processes which operated. Work carried out includes principally the generation of a soils map supplemented with soil profile descriptions and laboratory data. It also includes a soil-geomorphic analysis and interpretation, specifically the soil-geologic-archeologic relationships of the study area. Numerous undisturbed soil reference cores were also preserved as witness monoliths and are permanently curated.

SOIL MAP

Philosophy

As a reasonable first step towards gaining an understanding of the soil-geomorphic evolution of the study area, a soils mapping project was initiated. In addition to gaining insights on the spatial relationships between

soil types and associated landforms, it was anticipated that the accumulated information base necessary to produce a high resolution soil map would be invaluable for later soil-geomorphic, archeologic and geologic interpretations.

To produce a soil map that is meaningful for the purposes stated above, and one which maximally complements the geologic and archeologic work, it is necessary to map in considerably greater detail and scale than is necessary for a standard Soil Conservation Service survey report. This requires a much tighter network of sampling sites and, consequently, much more field work and supportive lab data than is normally necessary for soil mapping. Such high resolution soil mapping is time-intensive.

Description and Accuracy

The soil map that accompanies this report is designed to be largely self-explanatory. It is based on field work, on the use of black and white and color stereo-pair air-photos at various scales, and on laboratory data. During field mapping of the bottom lands in the study area, extensive use was made of a truck-mounted hydraulic coring rig, where 7 cm diameter soil cores were pulled on a close-interval grid system (approximately 20 meter squares). Such detailed mapping was not considered necessary for upland soils. Thus, while the mapping accuracy in general is at a reasonably high level, it is variable, probably ranging between 75 to 100% in the alluvial bottomlands, and somewhat less on the uplands (as opposed to 30-60% in many Soil Conservation Service

maps, Harris 1977). The estimated accuracy of different areas on the map are as follows:

Area, Geomorphic Surface, and Soils	Estimated Range of Accuracy
Bottom lands:	
T-0 (after Haynes 1976:49), Fluvents*	90 - 100%
T-1(b), Ochrepts, Udalfs	90 - 95
T-1(a), Udalfs, Aqualfs	80 - 95
T-2, Udalfs, Aqualfs, Udolls, Aquolls	80 - 90
T-3, Udalfs, Aqualfs	75 - 85
Uplands:	
Lost Hill - Udalfs, Aqualfs	75 - 85
Homestead Hill - Udalfs, Aqualfs	75 - 80
All others - Orthents, Udalfs, Udults	50 - 80

The highest mapping accuracy is in the Fluvents (TUfe soils) and the Ochrept-Udalf complex (DFeEoe, THae and Hua soils) on the floodplain and terraces of the Pomme de Terre River valley. The reason that these soils were mapped in greatest detail is because they are the ones *in which* (as opposed to *on which*) Woodland, and Archaic-late Paleo-Indian cultural materials respectively occur. The soil-geomorphic-archeologic relations are discussed in more detail later.

Map Organization

The accompanying map uses mapping units at the Great Group and Family levels of the Soil Taxonomy (Soil Survey Staff 1975). It is multi-colored and patterned to highlight orders, great groups, and subgroups of

*Soil terms used herein are carefully explained and defined on the map accompanying the report.

soils and their spatial relationships to one another. Further, it will show the location of each soil sampling site where (a) soil descriptions were made, (b) soil laboratory samples were collected, and (c) where soil witness monoliths were taken. This soil map, when used in conjunction with Figure 2, provides maximal information on soil-geomorphic relationships in the lower Pomme de Terre River valley.

SOIL REFERENCE MONOLITHS

Philosophy of Preserved "Witness Columns"

There are numerous advantages of making light-weight reference monoliths of Quaternary soils and sediments (Johnson and Alexander 1975). Such intact and undisturbed "witness columns" may be curated and used for reference by archeologists, pedologists, and geologists just as pressed plants and mounted skins are curated and used for reference by botanists and zoologists. Preserving soil witness columns in an area of great paleontologic and archeologic importance that is soon to be submerged by rising floodpool waters is highly desirable.

With this philosophy in mind, a systematic collection and preservation of undisturbed representative profiles described in the mapping area was undertaken. To date a total of 85 profiles have been curated. They are housed in a combination sotrage-display cabinet specially built for this purpose (Fig. 1).

Figure 1. Combination storage-display cabinet for soil monoliths.

Field Location and Curation of Monoliths

The field location of each reference monolith is shown on the accompanying map. The reference monoliths are curated at the Department of Geography, University of Illinois, Urbana, and are available for study to any interested party or parties upon request.

SOIL-GEOLOGIC, SOIL GEOMORPHIC, AND SOIL-ARCHEOLOGIC RELATIONSHIPS

Soil Type, Geologic Age and Topographic Position

One of the informative results of the research to date is that a clear relationship exists between soil type and the degree of soil profile development versus geologic age of the parent material and topographic position. For example, the TUfe soils show two different expressions of profile development; $TUfe_1$, a minimally expressed Fluvent profile developed on stratified alluvium of silt loam texture deposited within the past few decades; and $TUfe_2$, a more expressed profile, where stratification has been largely destroyed. Topographically, the $TUfe_1$ soils are lowest-lying whereas $TUfe^2$ soils occur elevationally higher above the river.

Similarly the Ochrepts ($DFeEoe_1$ and $DFeEoe_2$) exhibit better organized and developed profiles than the Udifluvents, and in almost every case lie topographically higher. The Alfisols and Ultisols maintain this soil-geologic pattern by respectively having stronger and

most organized profiles, while generally lying in topographically higher and highest positions on the landscape. These soil-geologic relationships are shown in Figure 2 (the principal exception to this otherwise consistent pattern is that some Udalfs occur with Ochrepts in topographically equivalent positions).

Breshear's Bottoms

One of the most complex soil areas on the map is in the old cutoff meander known as Breshear's Bottoms. The east side of the Bottoms is dominated by prairie soils (Mollisols), whereas the southern part is pedologically complex, with many different soils occurring over short horizontal distances. Most of the latter soils are old Alfisols having strongly expressed, highly ordered profiles.

The radiocarbon chronology established in Breshear's Bottoms shows that the original floodplain deposits, laid down by the Pomme de Terre River when it still occupied the old meander, are Pleistocene in age and beyond the range of C-14 dating (i.e., 40,000 B.P.; Haynes 1976). The soils complement the radiocarbon chronology by their frequent strong expression of age, namely in their highly ordered character (strong argillic horizon formation, and strong and deep profile differentiation).

High Energy Profiles

Another interesting relationship that has been discerned, a soil geomorphologic one, is where high energy

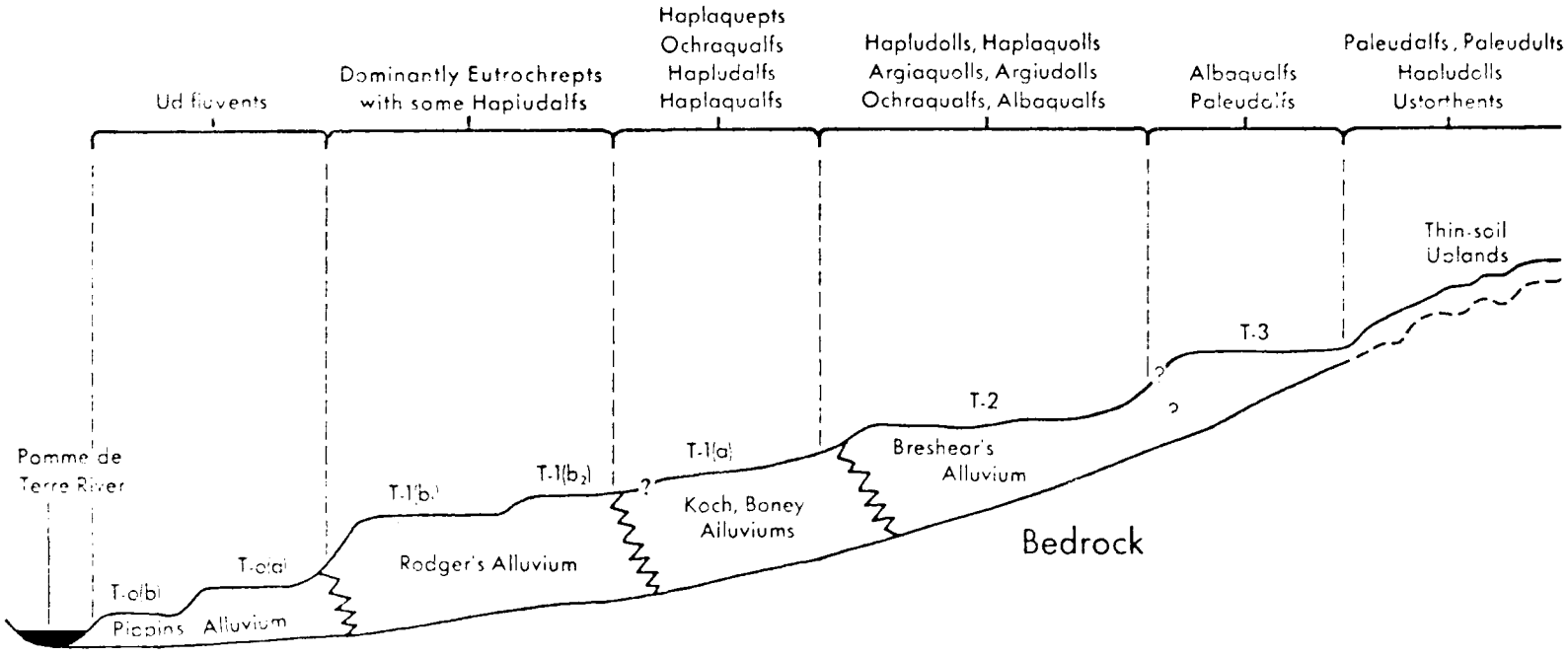

Figure 2. Soil-geomorphic, alluvial stratigraphic, and terrace relationships in the lower Pomme de Terre River basin.

profiles occur immediately downslope of spring seeps. A high energy profile is one that is well ordered and strongly differentiated (e.g., a strongly leached and weathered A_2, maximal clay movement and accumulation). Gravitational water is the chief energy source for ordering high energy profiles (Runge 1973:184). If relatively small amounts of water move through a profile little ordering occurs, other things being equal. If relatively large amounts of water move through a profile, it becomes well ordered (this model suggests that soil profiles are like chromatographic columns in that water flow through the column is the principal energy source for increasing the order or decreasing the entropy of the column).

For example, the Typic Albaqualfs at the very east end of Homestead Hill are maximally developed and occur immediately downslope from where intermittently flowing springs egress. With increasing downslope distance from the springs there is a consistent decrease in profile ordering.

Another example is on Terrace 1(b) west of the (former) suspension bridge on County Highway B, on the north side of the Pomme de Terre River. A small cattle pond betrays the presence of a spring that egresses just upslope from Udalfs developed in the terrace alluvium (called "Rodger's alluvium"). Near the spring the soil appears more ordered and is marginally intergrading from a Hapludalf towards an Albaqualf. It appears that, in general, soils closest to spring seeps (or any water energy source) have more strongly expressed profiles than those soils farther away. This information is valuable in soil genesis interpretations, in general, plus could

be used to locate formerly active springs that are presently dried up or extinct and not otherwise recognizable.

"Rodger's Alluvium"

A distinctive dark brown (moist) Holocene-aged deposit of river alluvium has been informally called "Rodger's alluvium" by Haynes and those of us working on the H. S. Truman Reservoir project. It appears to have begun being deposited about 11,000 years ago and stopped about 2000 years ago (Ahler 1976; Haynes 1976; Haynes personal communication 1978). It is an important geologic unit since most of the Archaic and late Paleo-Indian cultural materials occur in it (Ahler 1976, plus observations at the Montgomery, Hand and Sohn sites outside the study area but within the region). Rodger's alluvium is characterized by soils that range from Dystric Fluventic Eutrochrepts to moderately developed Hapludalfs almost everywhere it was found. Both soils are observably distinctive in the field. The relationship is so consistent that one could almost venture to say that, wherever such soils occur in the bottom lands in the area, Rodger's alluvium can be expected as the parent material.

Soil Archeologic Relationships

Several generalizations can be drawn from the soil-archeologic relationships discerned in the study. First, Archaic and Paleo-Indian cultural materials will not be found in situ in the Udifluvents of the Osage River Basin,

of which the Pomme de Terre is a tributary, unless the material is reworked and secondarily deposited or is intrusive by later Indians. The Udifluvents, and the parent alluvium in which they have formed, are very late Holocene in age, a conclusion also reached by Haynes (1976: 58) based on a radiocarbon chronology established for the Terrace-0 deposits. Likewise, no Woodland materials may be expected within Eutrochrept-Hapludalf profiles other than in the upper 25 to 50 cm or so (mainly the plow zone). The mapped Eutrochrept-Hapludalf complex in the study area is comprised of Holocene-aged soils developed in Rodgers alluvium which, as mentioned earlier, began accumulating about 11,000 years ago, and ceased accumulating (except for occasional overbank depositions) about 2000 years ago (Ahler 1976; Haynes, this volume). The upper 25 to 50 cm (approximately) of sediments are post-2000 B.P. overbank floodplain deposits. Woodland materials may, of course, be expected in the plow zone of <u>any</u> soil in the study area.

CONCLUDING COMMENTS

This report is meant to serve as a general overview of the work performed to date. A great amount of accumulated data has been generated through our work (and from which this report was drawn) but, beyond that contained in the Appendix, is not included here due to space and utilitarian considerations. Several scientific and general information reports for publication are in progress that will draw upon and disseminate this information.

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APPENDIX

The following appendix contains soil descriptions from the 7 cm diameter cores taken in the lower Pomme de Terre River valley. The reader will note that some locality descriptions are not included here: only those localities are presented that were relevant to constructing the accompanying soil map and to the preparation of the main body of the text.

Locality: 1

SOIL CLASSIFICATION: Dystric Fluventic Eutrochrept$_1$
PEDON NO,: 1
LOCATION: In the NE 1/4 SW 1/4, Sec. 34, T39N, R22W, Benton County, MO.
SLOPE (%): 0 - 2
GEOMORPHIC SURFACE: T - 1 (b)
LANDFORM: Floodplain
ELEVATION: 680 ft. (207.4 m)
NATURAL VEGETATION: Deciduous Forest
PARENT MATERIAL: Alluvium MONOLITH PRESERVED: 0 - 8 ft. (0-2.39 m)
COLLECTED BY: D. L. Johnson and M. V. Miller, July 10, 1975
DESCRIBED BY: D. L. Johnson and M. V. Miller, July 15, 1975

HORIZON	DEPTH(cm)	SOIL DESCRIPTION
Ap	0 - 18	Very dark gray brown (10 yr. 3/2 moist; 10 yr. 4/2 dry) silt loam; weak to moderate granular to very weak medium platy breaking out to weak to moderate medium subangular blocky; friable; pH 6.4; plentiful fine roots; clear wavy boundary to:
A_3	18 - 41	Very dark gray brown (10 yr. 3/2 moist; 10 yr. 5/2 dry) silt loam; moderate medium subangular blocky; friable; pH 6.45; plentiful to few fine roots; clear wavy boundary to:
B_2	41 - 76	Very dark gray brown (10 yr. 3/2 moist; 10 yr. 5/2 dry) silt loam; weak to moderate medium subangular blocky; friable; pH 6.5; very weak illuvial surfaces; few fine roots; gradual wavy boundary to:
B_3	76 -147	Dark brown (10 yr. 3/3 moist; 10 yr. 5/3 dry) silt loam; weak to moderate medium to coarse subangular blocky; friable; pH 6.5; very weak illuvial surfaces; very few fine roots;
C_1	147 -198	Dark brown (10 yr. 3/3 moist; 10 yr. 5/3 dry); loam; structureless single grain; very friable to loose; pH 6.6, gradual wavy boundary to:
C_2	198 -239	Dark brown (10 yr. 3/3 moist; 10 yr. 5/3 dry); sandy loam; structureless single grain; loose; pH 6.8.
		Remarks: Sampling terminated at 239 cm; some cherty gravels at 198 cm. Monolith preserved (0-239 cm)

Locality: 2

SOIL CLASSIFICATION: Dystric Fluventic Eutrochrept[1]
PEDON NO,: 2
LOCATION: In the NE 1/4 SW 1/4, Sec. 34, T39N, R22W, Benton County, MO.
SLOPE (%): 0-2
GEOMORPHIC SURFACE: T-1(b)
LANDFORM : Floodplain
ELEVATION: 690 Ft. (210.45 m)
NATURAL VEGETATION: Deciduous Forest
PARENT MATERIAL: Alluvium
COLLECTED BY: D. L. Johnson and M. V. Miller, July 10, 1975
DESCRIBED BY: D. L. Johnson and M. V. Miller, July 15, 1975

HORIZON	DEPTH(cm)	SOIL DESCRIPTION
Ap	0 - 18	Dark Brown (10 yr. 3/3 moist. 10 yr. 5/3 dry)silt loam; moderate medium granular; Friable; pH 6.1; plentiful fine roots; abrupt smooth boundary to:
A_3	18 - 28	Dark brown (10 yr. 3/3 moist; 10 yr. 5/3 dry) silt loam; moderate fine to medium subangular blocky; friable; pH 6.1; plentiful fine roots; clear wavy boundary to:
B_{21}	28 - 42	Dark brown (7.5 yr. 4/2 moist, 10 yr. 5/4 dry)loam; moderate medium subangular blocky; firable; pH 6.3; plentiful fine roots; weak clay skins; clear wavy boundary to:
B_{22}	42 - 51	Dark reddish brown (5 yr. 3/4 moist; 10 yr. 5/4 dry) silty clay loam; moderate medium subangular blocky; firm; pH 6.4; plentiful fine roots; well-developed clay skins; some cherty gravel and rocks; clear wavy boundary to:
IIB_{23}	51 - 71	Dark reddish brown (5 yr. 3/4 moist; 10 yr. 5/4 dry) silty clay loam; moderate medium subangular blocky; firm; pH 6.4; few fine roots; well-developed clay skins; gravelly;
		Remarks: Sampling terminated at 61 cm where a cherty layer was encountered; monolith preserved (0-71 cm)

Locality: 3

SOIL CLASSIFICATION: Typic Paleudalf
PEDON NO,: 3
LOCATION: In the NE 1/4 SW 1/4, Sec. 34, T39N, R22W, Benton County, Mo.
SLOPE (%): 0-2
GEOMORPHIC SURFACE: T-2 (?)
LANDFORM: lower footslope
ELEVATION: 690 ft. (210.45 m)
NATURAL VEGETATION: Deciduous forest
PARENT MATERIAL: Alluvium
COLLECTED BY: D. L. Johnson and M. V. Miller, July 10, 1975
DESCRIBED BY: D. L. Johnson and M. V. Miller, July 25, 1975

HORIZON	DEPTH(cm)	SOIL DESCRIPTION
Ap	0 - 17	Dark yellowish brown (10 yr. 3/4 moist; 10 yr. 5/2 dry) silt loam; weak fine subangular blocky; friable; pH 6.6; abrupt smooth boundary to:
B_1	17 - 27	Dark yellowish brown (10 yr. 4/4 moist; 10 yr. 5/3 dry) loam; moderate fine to medium subangular blocky; friable; pH 6.6; weak clay skins; abrupt wavy boundary to:
B_{21t}	27 - 56	Dark yellowish brown (10 yr. 4/4 moist; 10 yr. 5/4 dry) loam; moderate medium subangular blocky; friable; pH 6.8; concentration of stones in top 8 cm; clay skins; gradual wavy boundary to:
B_{22t}	56 - 89	Brown (7.5 yr. 4/4 moist; 10 yr. 5/6 dry) sandy clay loam; weak medium to coarse subangular blocky; friable; pH 6.8; well-developed clay skins; intermittent gravel; some sandy inclusions; gradual wavy boundary to:
B_3	89 - 119	Brown (7.5 yr. 4/4 moist; 10 yr. 5/4 dry) sandy clay loam; weak medium to coarse subangular blocky; friable; pH 6.6; intermittent gravel; sandy inclusions;
		Remarks: Sampling terminated at 119 cm. monolith preserved (0-119 cm)

Locality: 4

SOIL CLASSIFICATION: Hapludalf
PEDON NO,: 4
LOCATION: In the SE 1/4 NW 1/4, Sec. 34, T39N, R22W, Benton County, MO.
SLOPE (%): 0-2
GEOMORPHIC SURFACE: T-(a)?
LANDFORM: Toeslope
ELEVATION: 680 Ft. (207.4 m)
NATURAL VEGETATION: Deciduous Forest
PARENT MATERIAL: Alluvium
COLLECTED BY: D. L. Johnson and M. V. Miller, July 10, 1975
DESCRIBED BY: D. L. Johnson and M. V. Miller, July 25, 1975

HORIZON	DEPTH(cm)	SOIL DESCRIPTION
Ap	0 - 18	Brown (10 yr. 5/3 moist; 10 yr. 5/2 dry) silt loam; very weak medium platy breaking out to weak fine subangular blocky; very friable; pH 6.5; abrupt smooth boundary to:
IIA_1	18 - 36	Dark brown (10 yr 3/3 moist; 10 yr 5/3 dry) silt loam; weak to moderate medium subangular blocky; very friable; pH 6.7; clear wavy boundary to:
IIB_1	36 - 51	Dark yellowish brown (10 yr 4/4 moist; 10 yr 5/4 dry) silt loam; weak to moderate medium subangular blocky; friable; pH 6.8; faint clay skins; clear wavy boundary to:
IIB_{21t}	51 - 78	Brown (7.5 yr 4/4 moist; 10 yr. 5/4 dry) silt loam; weak fine prismatic breaking out to weak coarse subangular blocky; friable pH 6.8; well-developed clay skins; clear wavy boundary to:
IIB_{22t}	78 - 122	Brown (7.5 yr 4/4 moist; 10 yr 5/4 dry) silt loam; weak coarse subangular blocky; friable; pH 6.9; well-developed clay skins;
		Remarks: Sampling terminted at 122 cm. monolith preserved (0-119 cm)

Locality: 5

SOIL CLASSIFICATION: Albaquic Hapludalf
PEDON NO,: 5
LOCATION: In the NE 1/4 SW 1/4, Sec. 34, T39N, R22W, Benton County, MO.
SLOPE (%): 3-5
GEOMORPHIC SURFACE: T-2(?)
LANDFORM: Footslope
ELEVATION: 690 ft. (210.45 m)
NATURAL VEGETATION: Deciduous Forest
PARENT MATERIAL: Alluvium
COLLECTED BY: D. L. Johnson and M. V. Miller, July 10, 1975
DESCRIBED BY: D. L. Johnson and M. V. Miller, July 25, 1975

HORIZON	DEPTH(cm)	SOIL DESCRIPTION
Ap	0 - 24	Dark gray brown (10 yr 4/2 moist; 10 yr 6/2 dry) silt loam; weak medium to coarse platy breaking out to weak fine to medium subangular blocky; friable, pH 6.6; clear smooth boundary to:
A_2	24 - 48	Dark gray brown (10 yr. 4/2 moist; 10 yr. 6/3 dry) silt loam; weak to moderate medium subangular blocky; very friable; pH 6.8; Abrupt wavy boundary to:
B_{21t}	48 - 57	Dark brown (10 yr 3/3 moist; 10 yr 6/2 dry) loam; moderate medium subangular blocky; friable; pH 6.9; weak clay skins; concentration of manganese pellets at B_1/B_{2t} boundary; clear wavy boundary to:
B_{22tg}	57 - 122	Gray (10 yr 5/1 moist; 10 yr 5/3 dry) loam; moderate to strong medium to coarse subangular blocky; friable; pH 6.9; well-developed clay skins; plentiful manganese pellets; scattered cherty gravel; common medium prominent mottles colored yellowish red (5 yr 5/8 unrubbed) to red (2.5 yr 4/6 unrubbed); concentration of cherty gravel and sand at 119 cm; abrupt smooth boundary to:
IIB_3	122 - 187	Yellowish brown (10 yr 5/4 moist; 10 yr 5/4 dry) clay loam; weak; coarse, subangular blocky; very firm; pH 6.9, manganese nodules; gradual wavy boundary to:
$II\ C_1$	187 - 208	Yellowish brown (10 yr 5/4 moist; 10 yr 5/6 dry) sandy loam; single grain; loose; pH 7.2.

Remarks: Sampling terminated at 208 cm on cherty gravels. Monolith preserved (0-208cm).

Locality: 6

SOIL CLASSIFICATION: Typic Albaqualf
PEDON NO,: 6
LOCATION: In the NE 1/4 SW 1/4, Sec. 34, T39N, R22W, Benton County, MO.
SLOPE (%): 5-7
GEOMORPHIC SURFACE: T - 2(?)
LANDFORM : Footslope
ELEVATION : 700 ft (213.5 m)
NATURAL VEGETATION: Deciduous forest
PARENT MATERIAL: Alluvium
COLLECTED BY: D. L. Johnson and M. V. Miller, July 10, 1975
DESCRIBED BY: D. L. Johnson and M. V. Miller, July 26, 1975

HORIZON	DEPTH(cm)	SOIL DESCRIPTION
Ap	0 - 19	Brown (10 yr 4/3 moist; 10 yr. 6/2 dry) silt loam; weak medium platy breaking out to weak fine subangular blocky; friable pH 6.4; abrupt smooth boundary to:
A_2	19 - 68	Gray (10 yr 5/1 moist; 10 yr 7/2 dry) silt loam; weak fine to medium subangular blocky; very friable; pH 6.5; few fine faint mottles colored yellowish brown (10 yr 5/4 moist); large stone and concentration of manganese nodules at A_2/B_1 boundary; abrupt wavy boundary to:
B_{21tg}	68 - 78	Gray brown (10 yr 5/2 moist 10 yr 7/2 dry) loam; moderate medium subangular blocky; friable; pH 6.8; well-developed clay skins; common medium prominent mottles colored strong brown (7.5 yr 5/8 moist) to yellowish red (5 yr 4/8 moist) to red (2.5 yr 4/8 moist) clear wavy boundary to:
B_{22tg}	78 - 122	Dark gray (10 yr 4/1 moist; 10 yr 7/3 dry) clay loam; moderate medium to coarse subangular blocky; firm pH 7.0; very strong clay skins colored dark gray (7.5 yr 4/0 unrubbed); many medium prominent mottles colored red (2.5 yr 4/8 moist;
		Remarks: Sampling terminated at 122 cm. monolith preserved (0-119 cm).

Locality: 7

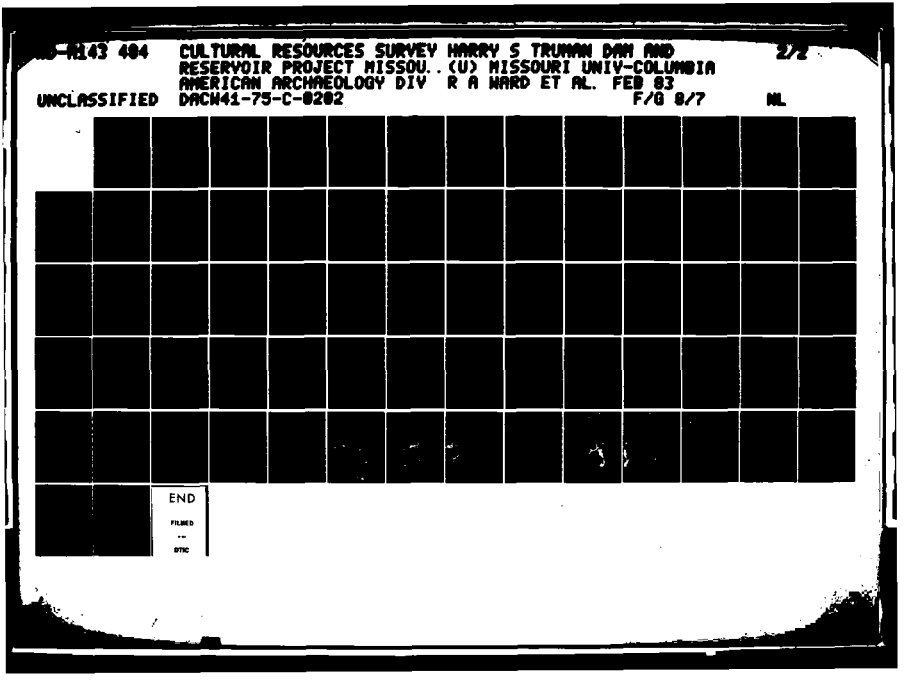
SOIL CLASSIFICATION: Typic Albaqualf
PEDON NO,: 7
LOCATION: In the NE 1/4 SW 1/4, Sec. 34, T39N, R22W, Benton County, MO.
SLOPE (%): 5-7
GEOMORPHIC SURFACE: T-2(?)
LANDFORM: Footslope
ELEVATION: 700 Ft. (213.5m)
NATURAL VEGETATION: Deciduous forest
PARENT MATERIAL: Alluvium
COLLECTED BY: D. L. Johnson and M. V. Miller, July 10, 1975
DESCRIBED BY: D. L. Johnson and M. V. Miller, July 26, 1975

HORIZON	DEPTH(cm)	SOIL DESCRIPTION
Ap	0 - 14	Brown (10 yr 4/3 moist; 10 yr 6/2 dry) silt loam; weak fine to medium subangluar blocky; friable; pH 6.8; abrupt smooth boundary to:
A_{12}	14 - 23	Brown (10 yr 4/3 moist; 10 yr 7/2 dry) silt loam; weak fine to medium subangular blocky; friable; pH 6.7; clear wavy boundary to:
A_2	23 - 36	Light brown gray (10 yr 6/2 moist; 10 yr 7/2 dry) silt loam; weak fine to medium subangular blocky; friable; pH 6.3; abrupt wavy boundary to:
B_{2tg}	36 - 90	Dark gray (10 yr 4/1 moist; 10 yr 6/1 dry) silty clay; weak to moderate medium prismatic breaking out to weak coarse subangular blocky; firm; pH 6.2 at top to 6.8 at bottom of horizon; moderate to weak silans; abrupt smooth boundary to:
B_3	90 - 119	Dark gray brown (2.5 yr 4/2 moist; 10 yr 6/1 dry) silty clay; structureless massive; firm; pH 7.0;
		Remarks: Sampling terminated at 119 cm. monolith preserved (0-119 cm)

Locality: 8

SOIL CLASSIFICATION: Typic Albaqualf
PEDON NO,: 8
LOCATION: In the NW 1/4 SW 1/4, Sec. 34, T39N, R22W, Benton County, MO.
SLOPE (%): 9-11
GEOMORPHIC SURFACE: T-2(?)
LANDFORM: Footslope
ELEVATION: 710 ft. (216.55 m)
NATURAL VEGETATION: deciduous forest
PARENT MATERIAL: alluvium
COLLECTED BY: D. L. Johnson and M. V. Miller, July 10, 1975
DESCRIBED BY: D. L. Johnson and M. V. Miller, July 26, 1975

HORIZON	DEPTH(cm)	SOIL DESCRIPTION
Ap	0 - 18	Dark gray (10 yr 4/1 moist; 10 yr 6/2 dry) silt loam; weak fine subangular blocky; friable; pH 6.9; clear smooth boundary to:
A_{21g}	18 - 33	Gray brown (10 yr 5/2 moist; 10 yr 7/2 dry) few medium, distinct mottles (10 yr 6/8 moist) silt loam; weak fine subangular blocky; friable; pH 6.8; few small Mn and Fe concretions; clear wavy boundary to:
A_{22g}	33 - 56	Light gray (10 yr 7/1 moist; 10 yr 7/2 dry) few, medium, distinct mottles (10 yr 6/8 moist) silt loam; weak fine subangular blocky; very friable; pH 6.7; common Mn Fe concretions, up to 7 mm dia; abrupt wavy boundary to:
B_{2tg}	56 - 152	Gray brown (10 yr 5/2 moist; 10 yr 6/2 dry) common medium distinct mottles (10 yr 6/8 moist); silty clay abundant clay skins; structureless massive; firm; pH 6.2 (top) to 7.0 (bottom); very few Fe concretions, Mn concretions common but smaller; gradual wavy boundary to:
B_{3g}	152 - 226	Pale brown (10 yr 6/3 moist; 10 yr 6/2 dry); common to many, medium to coarse, distinct mottles (10 yr 6/8 moist); clay loam; weak very coarse platy; firm; pH 7.0 (top) to 7.4 (bottom); abrupt smooth boundary to:
II C	226 - 244	Brownish yellow (10 yr 6/6 moist; 10 yr 6/1 dry); clay loam; structureless massive; firm; pH 7.4
		Remarks: Sampling terminated at 244 cm. mottling starts at 12 cm gradually increasing to a maximum in the B_{3g}, then decreasing thereafter. Concentrations of manganese concretions at 127 cm and at 178 cm. Monolith preserved (238.8 cm).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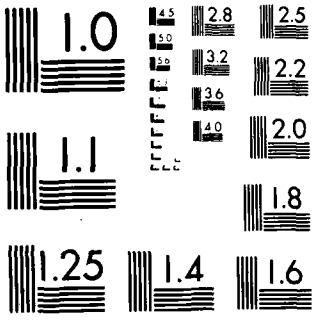

Locality: 10

SOIL CLASSIFICATION: Typic Albaqualf
PEDON NO,: 10
LOCATION: In the NW 1/4 SW 1/4, Sec. 34, T39N, R22W, Benton County, MO.
SLOPE (%): 10-12
GEOMORPHIC SURFACE:
LANDFORM: Upper Footslope
ELEVATION: 720 ft. (219.6 m)
NATURAL VEGETATION: Deciduous forest
PARENT MATERIAL: alluvium - Colluvium
COLLECTED BY: D. L. Johnson and M. V. Miller, July 10, 1975
DESCRIBED BY: D. L. Johnson and M. V. Miller, July 26, 1975

HORIZON	DEPTH(cm)	SOIL DESCRIPTION
Ap	0 - 17	Brown (10 yr. 4/3 moist; 10 yr 6/2 dry) silt loam; weak fine subangular blocky; very friable; pH 6.5; abrupt smooth boundary to:
IIA_{21}	17 - 25	Yellowish brown (10 yr 5/4 moist; 10 yr 6/3 dry) silty clay loam; moderate fine to medium subangular blocky; friable; ph=6.7; manganese nodules and cherty gravel; few fine faint mottles colored yellowish brown (10 yr 5/6 moist); abrupt wavy boundary to:
IIA_{22}	25 - 30	Yellowish brown (10 yr 5/4 moist; 10 yr 6/3 dry) silty clay loam; moderate fine subangular blocky; very friable; pH 6.7; manganese nodules and cherty gravel; few fine faint mottles colored yellowish brown (10 yr 5/6 moist); abrupt wavy boundary to:
IIB_{2t}	30 - 86	Yellowish brown (10 yr 5/4 moist; 10 yr 6/4 dry) silty clay loam; moderate medium to coarse subangular blocky; friable; pH 6.5 at top to 6.5 at bottom of profile; weak clay skins; manganese nodules and cherty gravel; few to common fine distinct mottles colored strong brown (7.5 yr 5/8 moist).
		Remarks: Sampling terminated at 86 cm. by truncated core. Monolith preserved (0-86 cm).

Locality: 11

SOIL CLASSIFICATION: Typic Ochraqualf
PEDON NO,: 11
LOCATION: In the NW 1/4 SW 1/4, Sec. 34, T39N, R22W, Benton County, MO.
SLOPE (%): 9-11
GEOMORPHIC SURFACE:
LANDFORM: Upper footslope
ELEVATION: 720 ft. (219.6m)
NATURAL VEGETATION: Deciduous forest
PARENT MATERIAL: Alluvium-colluvium
COLLECTED BY: D. L. Johnson and M. V. Miller, July 10, 1975
DESCRIBED BY: M. V. Miller, October 30, 1975

HORIZON	DEPTH(cm)	SOIL DESCRIPTION
A_1	0 - 13	Dark brown (10 yr 3/3 moist; 10 yr 5/2 dry) silt loam; weak fine to medium subangular blocky; very friable; pH 6.5; iron stains; scattered chert gravel; clear, smooth boundary to:
A_2	13 - 28	Dark yellowish brown (10 yr 3/4 moist; 10 yr 5/2 dry) silt loam; moderate medium subangular blocky; friable; pH 6.8; iron stains; scattered chert gravel; few manganese stains and very small nodules; clear wavy boundary to:
B_{21tg}	28 - 66	Dark gray brown (10 yr 4/2 moist; 10 yr 6/2 dry) silt loam; moderate medium to coarse subangular blocky; friable; pH 6.9; clay skins; iron stains increase in size; scattered chert gravel; manganese stains and small nodules; clear wavy boundary to:
B_{22tg}	66 - 89	Dark gray brown (10 yr 4/2 moist; 10 yr 6/3 dry) to brown (10 yr 4/3 moist) silt loam to silt loam; moderate medium to coarse subangular blocky; firm; pH 6.9; clay skins; iron stains become brighter and concretions appear; manganese nodules increase in size and abundance; scattered chert gravel; gradual wavy boundary to:
B_3	89 - 119	Brown (10 yr 4/3 moist; 10 yr 6/2 dry) silt clay loam; weak medium to coarse subangular blocky; firm to very firm; pH 6.9; decrease in clay skins; iron stains and concretions (5 mm diameter); manganese nodules plentiful (10 mm diameter); scattered chert gravel;
		Remarks: Sampling terminated at 119 cm. Monolith preserved (0-119 cm).

Locality: 12

SOIL CLASSIFICATION: Typic Paleudalf
PEDON NO,: 12
LOCATION: In the SW 1/4 SW 1/4, Sec, 34, T39N, R22W, Benton County, MO.
SLOPE (%): 0-2
GEOMORPHIC SURFACE:
LANDFORM: Interfluve (summit)
ELEVATION: 750 ft. (228.75 m)
NATURAL VEGETATION: mixed deciduous forest
PARENT MATERIAL: loess (?) over alluvial gravels (?) over dolomite
COLLECTED BY: D. L. Johnson and M. V. Miller, July 10, 1975
DESCRIBED BY: D. L. Johnson and M. V. Miller, N.D.

HORIZON	DEPTH(cm)	SOIL DESCRIPTION
Ap	0 - 18	Dark gray brown (10 yr 4/2 moist; 10 yr 6/3 dry) silt loam; weak fine to medium subangular blocky; friable; pH 4.8; abrupt smooth boundary to:
A_2	18 - 38	Yellowish brown (10 yr 5/6 moist; 7.5 yr 6/4 dry) silt loam; moderate medium subangular blocky; friable; pH 4.7; abrupt wavy boundary to:
B_{21t}	38 - 57	Strong brown (7.5 yr 5/6 moist; 7.5 yr 6/4 dry) clay loam to silty clay loam; moderate medium subangular blocky; friable; pH 5.0; clay skins; abrupt wavy boundary to:
B_{22t}	57 - 71	Strong brown (7.5 yr 5/6 moist; 7.5 yr 6/4 dry) clay loam; weak fine prismatic; friable; pH 5.0; clay skins manganese nodules appear at 66 cm.; abrupt wavy to irregular boundary to:
B_{31}	71 - 109	Color equally proportional (between gray (10 yr 6/1 moist; 10 yr 7/1 dry and yellowish red (5 yr 5/8 moist; 5 yr 5/6 dry) 10 cm; moderate medium to coarse prismatic; friable; pH 4.6; clay skins; manganese nodules extend to 83 cm; abrupt wavy boundary to:
B_{32}	109 - 119	Color equally proportional between gray (10 yr 6/1 moist; 10 yr 7/1 dry) and yellowish red (5 yr 5/8 moist; 10 yr 6/6 dry) loam; weak medium to coarse platy; consistence; pH 4.9; few clay skins;
		Remarks: Sampling terminated at 119 cm. Monolith preserved (0-119 cm).

Locality: 13

SOIL CLASSIFICATION: Typic Udifluvent$_2$
PEDON NO,: 13
LOCATION: In the Sw 1/4, Sec. 33, T39N, R22W, Benton County, MO.
SLOPE (%): 0-2
GEOMORPHIC SURFACE: T-0 (a)
LANDFORM: Floodplain
ELEVATION: 680 ft. (207.4m)
NATURAL VEGETATION: Deciduous forest
PARENT MATERIAL: Alluvium
COLLECTED BY: D. L. Johnson and M. V. Miller, July 10, 1975
DESCRIBED BY: M. V. Miller, October 22, 1975

HORIZON	DEPTH(cm)	SOIL DESCRIPTION
Surface		0.5 cm of gray sand
Ap	0 - 36	Very dark gray brown (10 yr 3/2 moist; 10 yr 5/2 dry) loam; weak fine to medium subangular blocky; friable; pH 6.5; clear wavy boundary to:
C_1	36 - 143	Very dark gray brown (10 yr 3/2 moist; 10 yr 5/2 dry) to dark brown (10 yr 3/3 moist) silt loam; moderate medium to coarse subangular blocky; friable; pH 7.0; few very weak, illuvial surfaces; from 40 cm. to 68 cm.; clear wavy boundary to:
C_2	143 - 213	Very dark gray brown (10 yr 3/2 moist; 10 yr 5/2 dry) silt loam; weak to moderate medium to coarse subangular blocky; friable; pH 7.0; very weak illuvial surfaces; gradual wavy boundary to:
II C_3	213 - 239	Very dark gray brown (10 yr 3/2 moist 10 yr 5/3 dry) silt loam to loam. Structureless massive; firm pH 7.0; very weak illuvial surfaces extend to 221 cm.
		Remarks: Sampling terminated at 239 cm. Monolith preserved (0-239 cm).

Locality: 14

SOIL CLASSIFICATION: Typic Ochraqualf
PEDON NO,: 14
LOCATION: In the NW 1/4, SE 1/4, Sec. 33, T39N, R22W, Benton County, MO.
SLOPE (%): 1-3
GEOMORPHIC SURFACE: T-1 (a)?
LANDFORM: Floodplain - Toeslope
ELEVATION: 700 ft. (213.5 m)
NATURAL VEGETATION: Deciduoud forest
PARENT MATERIAL: Alluvium
COLLECTED BY: D. L. Johnson and M. V. Miller, July 10, 1975
DESCRIBED BY: M. V. Miller, October 21, 1975

HORIZON	DEPTH(cm)	SOIL DESCRIPTION
AP	0 - 18	Very dark gray brown (10 yr 3/2 moist; 10 yr 5/2 dry) silt loam; weak fine subangular blocky; very friable; pH 5.5; clear smooth boundary to:
A_3	18 - 50	Very dark gray brown (10 yr 3/2 moist; 10 yr 5/2 dry) silt loam; moderate medium subangular blocky; friable; pH 6.2; clear wavy boundary to:
B_{21t}	50 - 91	Dark brown (10 yr 3/3 moist; 10 yr 5/2 dry) silty clay loam; strong moderate subangular blocky; firm; pH 6.2; clay skins; few fine distinct mottles colored yellowish brown (10 yr 5/8 unrubbed); gradual wavy boundary to:
B_{22t}	91 - 152	Dark yellowish brown (10 yr 3/4 moist; 10 yr 5/3 dry) silty clay loam; moderate to strong medium to coarse subangular blocky; firm; pH 6.3 to 7.1; clay skins; silans; few to many medium distinct mottles colored yellowish brown (10 yr 5/8 unrubbed) abrupt wavy boundary to:
B_{31}	152 - 179	Dark brown (7.5 yr 4/2 moist 10 yr 5/3 dry) silty clay loam; moderate medium subangular blocky; firm; pH 7.2; clay skins with increased thickness and continuity; common to many medium distinct mottles colored yellowish brown (10 yr 5/8 unrubbed); abrupt wavy boundary to:
B_{32g}	179 - 219	Dark gray (10 yr 4/1 moist; 10 yr 6/2 dry) silty clay loam; weak to moderate medium subangular blocky; firm pH 7.3; well-developed clay skins, but decreasing in thickness and continuity in lower 15 cm.; few fine distinct mottles colored yellowish brown (10 yr 5/8 unrubbed); clear wavy boundary to:
C_g	219 - 236	Dark gray (10 yr 4/1 moist; 10 yr 6/2 dry)silty clay loam; structureless massive; firm pH 7.2; no clay skins; few fine distinct mottles colored yellowish brown (10 yr 5/8 unrubbed);
		Remarks: Sampling terminated at 236 cm. Monolith preserved (0-236 cm).

Locality: 15

SOIL CLASSIFICATION: Typic Udifluvent
PEDON NO,: 15
LOCATION: In the NW 1/4, SW 1/4, Sec. 33, T39N, R22W, Benton Co., MO.
SLOPE (%): 0-2
GEOMORPHIC SURFACE: T-0 (a)
LANDFORM: Floodplain - toeslope
ELEVATION: 687 ft. (209.53 m)
NATURAL VEGETATION: Deciduous forest
PARENT MATERIAL: Alluvium
COLLECTED BY: D. L. Johnson and M. V. Miller, July 10, 1975
DESCRIBED BY: M. V. Miller, April 30, 1975

HORIZON	DEPTH(cm)	SOIL DESCRIPTION
Ap	0 - 18	Very dark gray brown (10 yr 3/2 moist; 10 yr 5/2 dry); silt loam; weak fine subangular blocky; friable; pH 6.9; abrupt smooth boundary to:
A_{12}	18 - 28	Very dark gray brown (10 yr 3/2 moist; 10 yr 5/2 dry); silt loam (inclusion of very fine sand); weak fine subangular blocky; friable; pH 7.0; Abrupt smooth boundary to:
C_1	28 - 69	Very dark gray brown (10 yr 3/2 moist; 10 yr 5/2 dry); silt loam; moderate to weak medium subangular blocky; friable; pH 7.0; very weak illuvial surfaces; gradual wavy boundary to:
C_2	69 - 119	Very dark gray brown (10 yr 3/2 moist; 10 yr 5/2 dry); silt loam; structureless to weak medium subangular blocky; firm; pH 7.0.
		Remarks: Description & sampling terminated at 119 cm. No mottling in profile. Monolith preserved (0-119 cm).

Locality: 17

SOIL CLASSIFICATION: Typic Udifluvent$_2$
PEDON NO,: 17
LOCATION: In the NW 1/4 SW 1/4, Sec. 3, T38N, R22W, Benton County, MO.

GEOMORPHIC SURFACE: T-0(a)?
LANDFORM: Toeslope
ELEVATION: 690 ft. (210.45 m)
NATURAL VEGETATION: Deciduous forest
PARENT MATERIAL: Alluvium
COLLECTED BY: D. L. Johnson and M. V. Miller, July 11, 1975
DESCRIBED BY: D. L. Johnson and M. V. Miller, October 28, 1975

HORIZON	DEPTH(cm)	SOIL DESCRIPTION
A_1	0 - 25	Very dark gray brown (10 yr 3/2 moist; 10 yr 5/2 dry) silt loam; weak fine subangular blocky; friable; pH 6.65. Abundant roots in top 4 cm.; abrupt smooth boundary to:
C_1	25 - 42	Very dark brown (10 yr 2/2 moist; 10 yr 4/3 dry) silt loam; weak to moderate medium subangular blocky; friable; pH 6.9; faint illuvial surfaces; discontinuous horizontal band of light-colored silt 0.15 cm thick at 30 cm; clear wavy boundary to:
C_2	42 - 88	Very dark brown (10 yr 2/2 moist 10 yr 4/2 dry) silt loam; moderate medium subangular blocky; friable; pH 6.9; faint, illuvial surfaces; continuous horizontal band of light-colored silt 0.15 cm thick at 81 cm; graudal wavy boundary to:
C_3	88 - 152	Very dark brown (10 yr 2/2 moist; 10 yr 4/2 dry) silt loam; weak to moderate fine to coarse subangular blocky; friable pH 6.9; faint illuvial surfaces; abrupt smooth boundary to:
IIC_4	152 - 178	Very dark gray brown (10 yr 3/2 moist; 10 yr 4/2 dry) loamy sand; structureless, single grain to very weak medium subangular blocky; friable pH 7.0; abundance of sand and gravel from 165 to 173 cm; alternate layers of silt and sand from 173 to 178 cm.; abrupt smooth boundary to:
$IIIA_b$	178 - 186	Very dark brown (10 yr 2/2 moist; 10 yr 5/2 dry) silt loam; structureless; friable; pH 6.95; abrupt wavy boundary to:
$IIIB_{1b}$	186 - 203	Very dark brown (10 yr 2/2 moist; 10 yr 5/2 dry) silt loam to silty clay loam; structureless; firm; pH 6.8; abrupt wavy boundary to:
$IIIB_{2b}$	203 - 226	Very dark brown (10 yr 2/2 moist; 10 yr 5/2 dry) sandy clay loam; structureless; firm; pH 6.9; abundant pebbles from 203 to 209 cm and from 217 to 226 cm; abrupt wavy boundary to:
IV	226 - 239	Very dark brown (10 yr 2/2 moist; 10 yr 5/1 dry) sandy clay loam structureless; firm to very firm; pH 7.0 iron stains; Remarks: Sampling terminated at 239 cm. Monolith preserved (0-239 cm

Locality: 18

SOIL CLASSIFICATION: Dystric Fluventic Eutrochrept
PEDON NO,: 18
LOCATION: In the NW 1/4 SW 1/4, Sec. 3, T38N, R22W, Benton County, MO
SLOPE(%): 0-2
GEOMORPHIC SURFACE: T-1(b)
LANDFORM: Floodplain Terrace (toeslope)
ELEVATION: 680 ft. (207.4 m)
NATURAL VEGETATION: Deciduous forest
PARENT MATERIAL: Alluvium
COLLECTED BY: D. L. Johnson and M. V. Miller, July 11, 1975
DESCRIBED BY: D. L. Johnson and M. V. Miller, July 31, 1975

HORIZON	DEPTH(cm)	SOIL DESCRIPTION
Ap	0 - 18	Very dark gray brown (10 yr 3/2 moist; 10 yr 5/2 dry); silt loam; weak fine subangular blocky; friable; pH 5.6; clear smooth to wavy boundary to:
A_{12}	18 - 48	Very dark gray brown (10 yr 3/2 moist; 10 yr 5/2 dry) silt loam; weak to moderate fine to medium subangular blocky; friable; pH 6.5; gradual wavy boundary to:
B_1	48 - 71	Very dark gray brown (10 yr 3/2 moist; 10 yr 5/3 dry) silt loam; weak to moderate medium subangular blocky; friable; pH 6.8 to 7.0; gradual wavy boundary to:
B_2	71 - 119	Dark brown (10 yr 3/3 moist; 10 yr 5/3 dry) silt loam; moderate medium to coarse prismatic breaking out to moderate coarse subangular blocky; friable; pH 7.0 to 7.1;
		Remarks: Sampling terminated at 119 cm. Monolith preserved (0-119 cm).

Locality: 19

SOIL CLASSIFICATION: Hapludalf
PEDON NO,: 19
LOCATION: In the NW 1/4 SW 1/4, Sec. 3, T38N, R22W, Benton County, MO.
SLOPE (%): 4-6
GEOMORPHIC SURFACE: T-1(b)
LANDFORM : Toeslope
ELEVATION : 690 ft. (210.45 m)
NATURAL VEGETATION: deciduous forest
PARENT MATERIAL: Alluvium
COLLECTED BY: D. L. Johnson and M. V. Miller, July 11, 1975
DESCRIBED BY: D. L. Johnson and M. V. Miller, N.D.

HORIZON	DEPTH(cm)	SOIL DESCRIPTION
O_1	0 - 6	Grass Root mat
A_1	6 - 48	Dark yellowish brown (10 yr 3/4 moist; 10 yr 5/3 dry) silt loam; moderate medium subangular blocky; friable; pH 6.9; gradual wavy boundary to:
B_{21t}	48 - 76	Dark yellowish brown (10 yr 4/4 moist; 10 yr 6/3 dry) silt loam; moderate medium to coarse subangular blocky; friable; pH 6.7; clay skins; clear wavy boundary to:
B_{22t}	76 - 119	Dark yellowish brown (10 yr 4/4 moist; 10 yr 6/3 dry) silt loam; moderate medium prismatic breaking out to moderate coarse subangular blocky; firm; pH 6.2; clay skins more developed than B_{21t}; whitish silt coatings (silans) on ped surfaces, increasing with depth;
		Remarks: Sampling terminated at 119 cm. Monolith preserved (0-119cm.)

Locality: 20

SOIL CLASSIFICATION: Typic Paleudalf
PEDON NO,: 20
LOCATION: In the NE SW 1/4, Sec. 3, T38N, R22W, Benton County, MO.
SLOPE (%): 1-3
GEOMORPHIC SURFACE: T-2 ?
LANDFORM: Toeslope
ELEVATION: 700 Ft. (213.5 m)
NATURAL VEGETATION: Deciduous forest
PARENT MATERIAL: Alluvium
COLLECTED BY: D. L. Johnson and M. V. Miller, July 11, 1975
DESCRIBED BY: M. V. Miller, October 23, 1975

HORIZON	DEPTH(cm)	SOIL DESCRIPTION
Ap	0 - 13	Brown (7.5 yr 4/4 moist; 10 yr 5/4 dry) loam to silt loam; weak fine subangular blocky to weak medium crumb; very friable pH 5.5; abundant roots; scattered pebbles; abrupt smooth boundary to:
A_1	13 - 20	Reddish brown (5 yr 4/4 moist; 7.5yr 6/4 dry) loam to silt loam; weak fine subangular blocky; very friable; pH 5.3; plentiful roots; scattered pebbles; clear wavy to smooth boundary to:
B_{21t}	20 - 56	Yellowish red (5 yr 4/6 moist; 5 yr 5/4 dry) clay loam; weak fine prismatic breaking out to moderate medium subangular blocky; friable; pH 5.2; few roots; some clay skins; scattered pebbles; few manganese stains appear at 38 cm; gradual wavy boundary to:
B_{22t}	56 - 91	Yellowish red (5 yr 4/8 moist; 7.5 yr 5/6 dry) clay loam; weak medium prismatic breaking out to strong medium subangular blocky; firm; pH 5.2; common clay skins; manganese stains and a few nodules; few roots; scattered pebbles; inclusions of fine sand and silt colored pale brown (10 yr 6/3 unrubbed) appear in root channels at 70 cm; gradual wavy boundary to
B_3	91 - 119	Yellowish red (5 yr 4/8 moist; 7.5 yr 5/6 dry) loam to clay loam; moderate coarse subangular blocky firm; pH 5.3; few roots; few clay skins; scattered gravel; plentiful manganese nodules; inclusions of fine sand and silt colored pale brown (10 yr 6/3 unrubbed) compose 30% to 40% of sample;
		Remarks: Sampling terminated at 119 cm. Monolith preserved (0 - 119 cm).

Things got hairy below 71 cm.

Locality: 21

SOIL CLASSIFICATION: Typic Paleudalf
PEDON NO,: 21
LOCATION: In the NW 1/4 SW 1/4, Sec. 3, T38N, R22W, Benton County, MO.
SLOPE (%): 2-4
GEOMORPHIC SURFACE: T-2
LANDFORM: Footslope
ELEVATION: 700 ft. (213.5 m)
NATURAL VEGETATION: Deciduous forest
PARENT MATERIAL: Alluvium
COLLECTED BY: D. L. Johnson and M. V. Miller, July 11, 1975
DESCRIBED BY: D. L. Johnson and M. V. Miller, July 31, 1975

HORIZON	DEPTH(cm)	SOIL DESCRIPTION
A_1	0 - 17	Dark yellowish brown (10 yr 4/4 moist; 10 yr 6/3 dry) silt loam; weak fine subangular blocky; friable; pH 6.0; abrupt wavy boundary to:
IIA_3	17 - 30	Brown (7.5 yr 4/4 moist; 10 yr 5/4 dry) silt loam; moderate fine to medium subangular blocky; friable; pH 6.0; manganese nodules; abrupt wavy boundary to:
IIB_{21t}	30 - 17	Reddish brown (5 yr 4/4 moist; 10 yr 5/8 dry) silty clay loam (top) to clay loam (bottom); moderate medium to coarse prismatic breaking out to moderate medium to coarse subangular blocky; friable; pH 5.8; well-developed clay skins colored gray (10 yr 5/1 unrubbed) to gray brown (10 yr 5/2 unrubbed); manganese stains and concretions; iron stains and concretions; abrupt wavy boundary to:
$IIIB_{22t}$	71 - 81	Strong brown (7.5 yr 5/6 moist; 10 yr 6/4 dry) silty clay to clay; rock and abundant chert fragments; iron and manganese concretions; pH 5.9: common medium distinct mottles ranging from 5 yr 4/4 to 4/8 moist.
IVB_{23t}	81 - 119	Strongbrown (7.5 yr 5/6 moist; 10 yr 6/4 dry) silty clay to silty clay loam; weak coarse prismatic (structureless massive in top 10 cm); firm; well-developed clay skins colored gray (10 yr 5/1 unrubbed) to dark gray (10 yr 4/1 unrubbed); pH 5.9 (top) to 6.0 (bottom); numerous iron stains and concretions; few manganese nodules; common fine faint mottles.
		Remarks: sampling terminated at 119 cm. Monolith preserved (0-119 cm.).

Locality: 22

SOIL CLASSIFICATION: Typic Paleudalf
PEDON NO,: 22
LOCATION: In the SE 1/4 SW 1/4, Sec. 3, T38N, R22W, Benton County, MO.
SLOPE (%): 2-4
GEOMORPHIC SURFACE: T-2 (?) or T-3 (?)
LANDFORM: Footslope
ELEVATION: 720 ft (219.6 m)
NATURAL VEGETATION: Deciduous forest
PARENT MATERIAL: Alluvium - colluvium (?)
COLLECTED BY: D. L. Johnson and M. V. Miller, July 11, 1975
DESCRIBED BY: D. L. Johnson and M. V. Miller, N.D.

HORIZON	DEPTH(cm)	SOIL DESCRIPTION
Ap	0 - 15	Dark yellowish brown (10 yr 3/4 moist; 10 yr 5/3 dry); loam; weak very fine to fine subangular blocky; friable; pH 6.1; clear smooth boundary to:
AB	15 - 24	Brown (7.5 yr 4/4 moist; 7.5 yr 6/4 dry) silt loam; moderate fine subangular blocky; friable; pH 6.3; clear wavy boundary to:
B_{21t}	24 - 38	Reddish brown (5 yr 4/4 moist; 7.5 yr 6/4 dry) clay loam; moderate fine to medium subangular blocky; firm; pH 6.5; few clay skins; concentration of manganese films and nodules at 28 cm; clear wavy boundary to:
B_{22t}	38 - 71	Yellowish red (5 yr 4/6 moist; 7.5 yr 5/6 dry) clay loam; strong medium subangular blocky; firm; pH 6.6; common clay skins; common, medium to coarse distinct mottles colored yellowish red (5 yr 4/6 dry); gradual wavy boundary to:
B_3	71 - 122	Yellowish red (5 yr 4/8 moist; 7.5 yr 5/6 dry) clay loam; moderate medium to coarse subangular blocky; friable; pH 6.4; few, weak clay skins; common, medium to coarse, distinct mottles; colored yellowish red (5 yr 4/6 dry); concentration of cherty gravel from 107 cm to end of sample;
		Remarks: Sampling terminated at 122 cm. Monolith preserved (0-119 cm).

Locality: 23

SOIL CLASSIFICATION: Typic Ochraqualf
PEDON NO.: 23
LOCATION: In the Se 1/4 SW 1/4, Sec. 3, T38N, R22W, Benton County, MO.
SLOPE(%): 8-10
GEOMORPHIC SURFACE: T-2(?) or T-3(?)
LANDFORM: Footslope
ELEVATION: 730 ft. (222.65 m)
NATURAL VEGETATION: Deciduous forest
PARENT MATERIAL: Alluvium-colluvium(?)
COLLECTED BY: D. L. Johnson and M. V. Miller, July 11, 1975
DESCRIBED BY: D. L. Johnson and M. V. Miller, July 31, 1975

HORIZON	DEPTH(cm)	SOIL DESCRIPTION
A_1	0 - 19	Brown (10 yr 4/3 moist; 10 yr 5/3 dry) silt loam; weak fine subangular blocky; friable; pH 5.2; abrupt smooth to wavy boundary to:
A_{2x}	19 - 34	Brown (10 yr 4/3 moist; 10 yr 6/3 dry) silt loam; weak to moderate fine to medium subangular blocky; friable; pH 5.5; abrupt wavy boundary to:
B_{2tg}	34 - 71	Pale brown (10 yr 6/3 moist; 10 yr 6/3 dry) clay; moderate to strong medium to coarse subangular blocky; firm; pH 4.9; clay skins colored dark gray (10 yr 4/1 unrubbed); common medium to coarse faint mottles colored dark yellowish brown (10 yr 4/4 unrubbed); abrupt wavy boundary to:
B_{31g}	71 - 86	Brown (10 yr 5/3 moist; 10 yr 6/4 dry) silt loam; weak medium subangular blocky; friable; pH 5.5; fewer clay skins; manganese nodules; many medium to coarse distinct mottles colored yellowish brown (10 yr 5/6 to 5/8 unrubbed); abrupt wavy boundary to:
B_{32g}	86 - 119	Brown (10 yr 5/3 moist; 10 yr 6/3 dry) silt loam to clay loam; weak to moderate medium to coarse platy; friable; pH 5.9 to 6.5; few clay skins; manganese nodules; many medium to coarse distinct mottles colored yellowish brown (10 yr 5/6 to 5/8 unrubbed);
		Remarks: Sampling terminated at 119 cm. Monolith preserved (0-119 cm). Slight fragic character in lower A_2 at 30 cm.

Locality: 24

SOIL CLASSIFICATION: Typic Ochraqualf
PEDON NO,: 24
LOCATION: In the SE 1/4 SW 1/4, Sec. 3, T38N, R22W, Benton County, MO.
SLOPE (%): 8-10
GEOMORPHIC SURFACE: T-2(?) or T-3(?)
LANDFORM: Footslope
ELEVATION: 730 ft. (222.65 m)
NATURAL VEGETATION: Deciduous forest
PARENT MATERIAL: Alluvium-colluvium(?)
COLLECTED BY: D. L. Johnson and M. V. Miller, July 11, 1975
DESCRIBED BY: D. L. Johnson and M. V. Miller, August, 1, 1975

HORIZON	DEPTH(cm)	SOIL DESCRIPTION
A_{1g}	0 - 15	Gray (10 yr 5/1 moist; 10 yr 6/2 dry) silt clay loam; weak medium subangular blocky; friable; pH 4.0; iron stains and concretions; abrupt wavy boundary to:
B_{21tg}	15 - 35	Gray (10 yr 5/1 moist; 10 yr 5/3 dry) silty clay; weak medium to coarse subangular blocky; friable; pH 4.3; clay skins; iron stains and concretions; abrupt wavy boundary to:
B_{22tg}	35 - 61	Gray (10 yr 6/1 moist; 10 yr 6/3 dry) silty clay; structureless massive; firm; pH 4.5; iron stains and concretions; common fine to medium faint mottles colored yellowish brown (10 yr 5/6 unrubbed); clear wavy boundary to:
B_{23tg}	61 - 81	Gray (10 yr 5/1 moist; 10 yr 6/3 dry) silty clay loam; weak medium to coarse subangular blocky; firm to friable; pH 4.8; clay skins; iron stains and concretions; manganese nodules; many medium to coarse faint mottles colored dark yellowish brown (10 yr 4/4 unrubbed); clear wavy boundary to:
B_{3g}	81 - 119	Yellowish brown (10 yr 5/6 moist; 10 yr 6/4 dry) clay loam; weak to moderate coarse subangular blocky; firm to friable; pH 5.0 to 5.2; clay skins; iron stains and concretions; manganese nodules; common, medium faint mottles colored yellow brown (10 yr 5/8 moist).
		Remarks: Sampling terminated at 119 cm. Monolith preserved (0-119 cm).

Locality: 25

SOIL CLASSIFICATION: Typic Albaqualf
PEDON NO.: 25
LOCATION: In the NE 1/4 NW 1/4, sec. 9, T38N, R22W, Hickory county, MO.
SLOPE (%): 1-2
GEOMORPHIC SURFACE: T-2
LANDFORM: Abandoned meander (toeslope)
ELEVATION: 720 (219.6 m)
NATURAL VEGETATION: Deciduous forest
PARENT MATERIAL: Alluvium
COLLECTED BY: D. L. Johnson and M. V. Miller, July 12, 1975
DESCRIBED BY: D. L. Johnson and M. V. Miller, July 28, 1975

HORIZON	DEPTH(cm)	SOIL DESCRIPTION
Ap	0 - 18	Brown (10 yr 4/3 moist; 10 yr 5/2 dry) silt loam; weak fine subangular blocky; friable; pH 6.0; abrupt smooth boundary to:
A_2	18 - 33	Gray brown (10 yr 5/2 moist; 10 yr 7/1 dry) silt loam; weak medium subangular blocky; friable; pH 6.1; manganese stains and nodules; abrupt wavy boundary to:
B_{21t}	33 - 66	Brown (7.5 yr 4/4 moist; 10 yr 6/3 dry) silty clay loam to silty class; moderate medium prismatic; friable; pH 6.0; weak clay skins; manganese stains and nodules; common fine prominent mottles colored red (2.5 yr 4/6 unrubbed); clear wavy boundary to:
B_{22tg}	66 - 97	Gray (10 yr 5/1 moist; 10 yr 6/3 dry) silty clay; weak coarse subangular blocky; firm; pH 6.1; very well-developed clay skins; manganese stains and nodules; many medium to coarse prominent mottles colored red (2.5 yr 4/6 unrubbed); abrupt wavy boundary to:
B_{3g}	97 - 119	Gray (10 yr 5/1 moist; 10 yr 6/4 dry) silty clay; structureless massive; firm; pH 6.2; well-developed clay skins; manganese stains and nodules; many coarse distinct mottles colored yellowish brown (10 yr 5/8 unrubbed);
		Remarks: Sampling terminated at 119 cm. Monolith preserved (0-119 cm).

Locality: 26

SOIL CLASSIFICATION: Typic Argiaquoll
PEDON NO,: 26
LOCATION: In the NE 1/4 NW 1/4, Sec. 9, T38N, R22W, Hickory County, MO.
SLOPE (%): 2-4
GEOMORPHIC SURFACE: T-2
LANDFORM: Abandoned meander (toeslope)
ELEVATION: 730 ft. (222.65 m)
NATURAL VEGETATION: Bottomland prairie
PARENT MATERIAL: Alluvium
COLLECTED BY: D. L. Johnson and M. V. Miller, July 12, 1975
DESCRIBED BY: D. L. Johnson and M. V. Miller, July 28, 1975

HORIZON	DEPTH(cm)	SOIL DESCRIPTION
Ap	0 - 16	Black (10 yr 2/1 moist; 10 yr 3/1 dry) silt loam; weak subangular blocky; friable; pH=6.15; abrupt smooth boundary to:
A_{12}	16 - 35	Very dark brown (10 yr 2/2 moist; 10 yr 5/1 dry) silty clay loam; moderate medium subangular blocky; friable; pH=6.21; abrupt wavy boundary to:
B_1	35 - 53	Dark gray (10 yr 4/1 moist; 10 yr 6.1 dry) silty clay loam; weak medium prismatic breaking out to moderate medium to coarse subangular blocky; friable; pH=6.5; clear wavy boundary to:
B_{21t}	53 - 71	Dark gray brown (10 yr 4/2 moist; 10 yr 6/1 dry) silty clay; weak coarse subangular blocky; firm; pH=6.7; manganese nodules; abundant clay skins; clear wavy boundary to:
B_{22t}	71 - 94	Dark yellowish brown (10 yr 6/4 moist; 2.5 yr 6/2 dry) silty clay; moderate medium to coarse subangular blocky; firm; pH=7.6; manganese nodules; abundant clay skins many many medium fine to distinct mottles colored yellowish brown (10 yr 5/6 unrubbed), abrupt wavy boundary to:
B_{3g}	94 - 119	Gray (10 yr 6/1 moist; 10 yr 7/1 dry) silty clay; structureless massive to weak coarse prismatic ; firm; pH=7.6; manganese nodules; abundant clayskins; few fine faint mottles colored light yellowish brown (10 yr 6/4 unrubbed);
		Remarks: Sampling terminated at 119 cm. Monolith preserved (0-119 cm).

Locality: 27

SOIL CLASSIFICATION: Typic Argiaquoll
PEDON NO,: 27
LOCATION: In the NE 1/4 NW 1/4, Sec. 9, T38N, R22W, Hickory County, MO.
SLOPE (%): 4-6
GEOMORPHIC SURFACE: T-2
LANDFORM: Abandoned meander (toeslope)
ELEVATION: 740 ft. (225.7 m)
NATURAL VEGETATION: Bottomland prairie
PARENT MATERIAL: Alluvium
COLLECTED BY: D. L. Johnson and M. V. Miller, July 12, 1975
DESCRIBED BY: D. L. Johnson and M. V. Miller, July 29, 1975

HORIZON	DEPTH(cm)	SOIL DESCRIPTION
Ap	0 - 16	Very dark brown (10 yr 2/2 moist; 10 yr 4/1 dry) silt loam; weak fine to medium subangular blocky; friable; pH 5.9; abrupt smooth boundary to:
A_3	16 - 25	Very dark gray (10 yr 3/1 moist; 10 yr 4/1 dry) silty clay loam; weak medium subangular blocky; friable; pH 5.8; abrupt wavy boundary to:
B_{21}	25 - 48	Very dark gray (10 yr 3/1 moist; 10 yr 4/1 dry) silty clay loam; moderate medium prismatic; friable to firm; pH 5.8; weak clay skins; small iron concretions; abrupt wavy boundary to:
B_{22t}	48 - 66	Very dark gray (10 yr 3/1 moist; 10 yr 5/1 dry) silty clay loam; weak coarse subangular blocky; firm; pH 5.9; clay skins; small iron concretions; gradual wavy boundary to:
B_{23t}	66 - 71	Dark brown (10 yr 3/3 moist; 10 yr 5/1 dry) silty clay loam; weak coarse subangular blocky to structureless massive; firm; pH 6.0; well-developed clay skins colored dark gray (10 yr 4/1 unrubbed); iron concretions; common medium faint to distinct mottles colored yellowish brown (10 yr 5/6 unrubbed); gradual wavy boundary to:
B_{3g}	71 - 119	Gray (10 yr 5/1 moist; 10 yr 6.1 dry) silty clay loam; structureless massive; firm; pH 6.1; clay skins; iron concretions; common medium faint to distinct mottles colored yellowish brown (10 yr 5/6 unrubbed);
		Remarks: Sampling terminated at 119 cm. Monolith preserved (0-119 cm).

Locality: 28

SOIL CLASSIFICATION: Aquic Argiudoll
PEDON NO.: 28
LOCATION: In the SW 1/4 NW 1/4, Sec. 4, T38N, R22W, Hickory County, MO.
SLOPE (%): 2-4
GEOMORPHIC SURFACE: T-2
LANDFORM: Abandoned meander(toeslope)
ELEVATION: 730 ft. (222.65 m)
NATURAL VEGETATION: Bottomland prairie
PARENT MATERIAL: Alluvium
COLLECTED BY: D. L. Johnson and M. V. Miller, July 12, 1975
DESCRIBED BY: D. L. Johnson and M. V. Miller, July 29, 1975

HORIZON	DEPTH(cm)	SOIL DESCRIPTION
Ap	0 - 16	Very dark gray brown (10 yr 3/2 moist; 10 yr 4/2 dry) silt loam; weak fine subangular blocky; friable; plenitful roots; pH 5.1; abrupt smooth boundary to:
A_3	16 - 29	Dark yellowish brown (10 yr 4/4 moist; 10 yr 5/3 dry) silty clay loam; weak fine to medium subangular blocky; friable; few roots; pH 5.7; manganese nodules appear at 25 cm; clear wavy boundary to:
B_{2t}	29 - 56	Brown (7.5 yr 4/4 moist; 10 yr 5/4 dry) silty clay loam; weak to moderate medium prismatic; friable; few roots; pH=5.8; well-developed clay skins; manganese nodules; clear wavy boundary to:
B_3	56 - 81	Brown (7.5 yr 4/4 moist; 10 yr 5/4 dry) silty clay loam; weak to moderate medium to coarse subangular blocky; friable to firm; very few roots; pH 5.9; weak clay skins; manganese nodules; few to common fine to medium prominent mottles colored yellowish red (5 yr 4/8 unrubbed) to strong brown (7.5 yr 4/6 unrubbed)
		Remarks: Sample truncated at 81 cm. Monolith preserved (0-81 cm).

Locality: 29

SOIL CLASSIFICATION: Typic Arglaquoll
PEDON NO,: 29
LOCATION: In the SW 1/4 NW 1/4, Sec. 4, T38N, R22W, Hickory County, MO.
SLOPE (%): 0-2
GEOMORPHIC SURFACE: T-2
LANDFORM: Abandoned meander (toeslope)
ELEVATION: 720 ft. (219.6 m)
NATURAL VEGETATION: Bottomland prairie
PARENT MATERIAL: Alluvium
COLLECTED BY: D. L. Johnson and M. V. Miller, July 12, 1975
DESCRIBED BY: D. L. Johnson and M. V. Miller, July 29, 1975

HORIZON	DEPTH(cm)	SOIL DESCRIPTION
Ap	0 - 16	Very dark gray brown (10 yr 3/2 moist; 10 yr 5/1 dry) silt loam; weak fine subangular blocky; friable; pH 5.9; iron concretions; abrupt smooth boundary to:
A_3	16 - 25	Dark brown (10 yr 4/3 moist; 10 yr 6/1 dry) silty clay; weak fine to medium subangular blocky; friable; pH 6.1; iron concretions; clear wavy boundary to:
B_{21t}	25 - 54	Brown (10 yr 5/3 moist; 10 yr 6/1 dry) silty clay; moderate medium to coarse subangular blocky; firm; pH 6.2; iron concretions; manganese nodules; clear wavy boundary to:
B_{22tg}	54 - 71	Gray (10 yr 5/1 moist; 10 yr 7/2 dry) silty clay; structureless massive; firm; pH=6.2; clay skins colored dark gray (10 yr 4/1 unrubbed); iron concretions; manganese nodules; gradual wavy boundary to:
B_{22b}	71 - 119	Yellowish brown (10 yr 5/4 moist; 10 yr 6/3 dry) silty clay loam; weak coarse subangular blocky; firm; pH 6.2; clay skins colored dark gray (10 yr 4/1 unrubbed); iron concretions; manganese nodules; many medium to coarse distinct mottles colored dark yellowish brown (10 yr 4/6 unrubbed); color change to gray (10 yr 5/1 unrubbed) in bottom 7 cm.
		Remarks: Sampling terminated at 119 cm. Monolith preserved (0-119 cm).

Locality: 30

SOIL CLASSIFICATION: Typic Argiaquoll
PEDON NO,: 30
LOCATION: In the SW 1/4 NW 1/4, Sec. 4, T38N, R22W, Hickory County, MO.
SLOPE (%): 0-2
GEOMORPHIC SURFACE: T-2
LANDFORM: Abandoned meander (toeslope)
ELEVATION: 720 ft. (219.6 m)
NATURAL VEGETATION: Bottomland prairie
PARENT MATERIAL: Alluvium
COLLECTED BY: D. L. Johnson and M. V. Miller, July 12, 1975
DESCRIBED BY: D. L. Johnson and M. V. Miller, July 30, 1975

HORIZON	DEPTH(cm)	SOIL DESCRIPTION
Ap	0 - 18	Very dark gray brown (10 yr 3/2 moist; 10 yr 5/2 dry) silt loam; weak fine to medium subangular blocky; friable; pH 6.2; very small iron concretions; abrupt smooth boundary to:
A_3	18 - 33	Very dark gray brown (10 yr 3/2 moist; 10 yr 5/1 dry) silt loam; weak medium subangular blocky; friable; pH=6.0; very small iron concretions; abrupt smooth boundary to:
A_{1b}	33 - 66	Very dark gray (10 yr 3/1 moist; 10 yr 5/1 dry) silty clay loam; moderate medium subangular blocky; friable; pH 6.1; iron concretions; abrupt wavy boundary to:
B_{2tgb}	66 - 86	Dark gray brown (10 yr 4/2 moist; 10 yr 6/2 dry) silty clay; moderate medium prismatic; firm; pH 6.5; thick continuous clay skins colored dark gray (10 yr 4/1 unrubbed); manganese nodules; iron concretions; many fine to medium distinct to prominent mottles colored yellowish brown (10 yr 5/6 to 5/8 unrubbed); clear wavy boundary to:
B_{3gb}	86 - ?	Olive (5Y 5/4 moist; 10 yr 6/1 dry) silty clay; moderate medium prismatic; firm; pH 6.6; clay skins colored dark gray (10 yr 4/1 unrubbed); manganese nodules; iron concretions; common to many fine faint mottles colored brownish yellow (10 yr 6/6 unrubbed);

Remarks: Sampling terminated at 119 cm.

Locality: 35

SOIL CLASSIFICATION: Typic Udifluvent$_2$
PEDON NO,: 35 (mapped as UFEZ classification: Entisol)
LOCATION: In the SE 1/4 NE 1/4, Sec. 10, R22W, T38N, Hickory County, MO.
SLOPE (%): 0-2
GEOMORPHIC SURFACE: T-0(a)
LANDFORM: Floodplain-toeslope
ELEVATION: 690 ft. (210.5 m)
NATURAL VEGETATION: Deciduous forest
PARENT MATERIAL: Alluvium
COLLECTED BY: D. L. Johnson and M. V. Miller, June 15, 1976
DESCRIBED BY: D. L. Johnson and M. V. Miller, March 16, 1976

HORIZON	DEPTH(cm)	SOIL DESCRIPTION
Ap	0 - 18	Very dark gray brown (10 yr 3/2 moist; 2.5 yr 5/2 dry) silt loam; weak medium subangular blocky; friable; pH 6.1; abrupt smooth boundary to:
A_{12}	18 - 43	Very dark gray brown (10 yr 3/2 moist; 10 yr 5/2 dry) silt loam; weak medium subangular blocky; friable; pH 6.4; gradual irregular boundary to:
C_1	43 - 119	Very dark gray brown (10 yr 3/2 moist; 2.5 yr 5/2 dry)silt loam; weak medium to coarse subangular blocky; friable; pH 6.4 faint illuvial surfaces.
		Remarks: Sampling terminated at 119 cm. Monolith preserved (0-119 cm).

Locality: 38

SOIL CLASSIFICATION: Typic Paleudalf
PEDON NO,: 38
LOCATION: In the SW 1/4 NE 1/4, Sec. 10, T38N, R22W, Hickory County, MO.
SLOPE (%): 8-10
GEOMORPHIC SURFACE: T-2(?) or T-3 (?)
LANDFORM: Footslope
ELEVATION: 740 ft. (225.7 m)
NATURAL VEGETATION: Deciduous forest
PARENT MATERIAL: Alluvium
COLLECTED BY: D. L. Johnson and M. V. Miller, June 16, 1976
DESCRIBED BY: D. L. Johnson and M. V. Miller, N.D.

HORIZON	DEPTH(cm)	SOIL DESCRIPTION
surface A_p	0 - 10	Dark Brown (10 yr 4/3 moist; 10 yr 6/3 dry (0-6") silt loam; weak fine platy; friable; pH 6.3 abrupt smooth boundary to:
A_{21}	10 - 23	Dark brown (10 yr 4/3 moist; 10 yr 7/4 dry) silt loam; weak fine to medium subangular blocky; friable; pH 6.4 clear wavy boundary to:
A_{22}	23 - 45	Light yellowish brown (10 yr 6/4 moist; 10 yr 7/4 dry) silt loam; weak fine to medium subangular blocky; friable; pH 5.6; abrupt wavy boundary to:
B_{21t}	45 - 64	Yellowish brown (10 yr 5/4 moist; 10 yr 7/4 dry) silty clay loam; moderate fine to medium subangular blocky; friable; pH 5.2; clay skins appear at 45 cm. and increase with depth; manganese appears at 48 cm. and increases with depth; common fine distinct mottles colored yellowish red (5 yr 4/8 unrubbed) to brown (10 yr 5/3 unrubbed) appear at 55 cm.; clear wavy boundary to:
B_{22t}	64 - 163	Dark Brown (7.5 yr 4/4 moist; 5 yr 5/8 dry) to yellowish red (5 yr 4/8 moist) loam; weak medium to coarse to coarse subangular blocky; firm; pH 5.2; clay skins; large manganese films; many medium to coarse prominent mottles colored brown (10 yr 5/3 unrubbed) to red (2.5 yr 4/6 unrubbed); gradual wavy boundary to:
B_{23}	163 - 190	Dark brown (10 yr 4/3 moist; 7.5 yr 6/6 dry) clay loam; structureless massive; firm pH 5.7; decreased mottling;
		Remarks: B/C boundary not encountered, sampling terminated at 190 cm. Monolith preserved (0-190 cm.).

Locality: 39

SOIL CLASSIFICATION: Typic Albaqualf
PEDON NO,: 39
LOCATION: In the NW 1/4 NE 1/4, Sec. 1 , T38N, R22W, Hickory County, MO.
SLOPE (%): 0-2
GEOMORPHIC SURFACE: T-1 (?)
LANDFORM: Toeslope
ELEVATION: 710 ft (216.6 m)
NATURAL VEGETATION: Deciduous forest
PARENT MATERIAL: Alluvium
COLLECTED BY: D. L. Johnson and M. V. Miller, July 16, 1976
DESCRIBED BY: D. L. Johnson and M. V. Miller, Summer, 1976

HORIZON	DEPTH(cm)	SOIL DESCRIPTION
Ap	0 - 15	Dark gray brown (10 yr 4/2 moist; 10 yr 6/2 dry) silt loam; weak medium to coarse platy; friable; pH 5.7; abundant roots at surface, decreasing with depth; abrupt smooth boundary to:
A_{12}	15 - 25	Dark gray brown (10 yr 4/2 moist; 10 yr 6/2 dry) silt loam; weak medium to coarse platy; friable; roots plentiful; silans; Few small manganese nodules; pH 6.0; abrupt smooth boundary to:
A_2	25 - 71	Gray brown (10 yr 5/2 moist; 10 yr 7/2 dry) silt loam; weak medium subangular blocky; friable; pH 5.7; few roots; silans; few small manganese nodules; few fine distinct mottles colored strong brown (7.5 yr 5/6 unrubbed); gradual irregular boundary to:
B_{21t}	71 - 157	Dark yellowish brown (10 yr 3/4 moist; 10 yr 6/3 dry) to dark brown (10 yr 3/3 moist) silt loam to silty clay loam; very weak medium to coarse subangular blocky and weak coarse platy and weak medium prismatic breaking to subangular blocky; friable to firm; pH 5.4; very few roots extending to 86 cm.; discontinuous silans to 132 cm., clay skins appear at 91 cm. increasing with depth; manganese in few small nodules and forming with clay skins; many medium to coarse faint and distinct mottles colored strong brown (7.5 yr 5/6 unrubbed); gradual irregular boundary to:
B_3	157 - 330	Yellowish brown (10 yr 5/4 moist; 10 yr 6/4 dry) silt loam; weak coarse platy to structureless massive; firm; pH 5.7; clay skins with manganese extend to 239 cm.; few small manganese nodules; chert layer from 208 cm. to 229 cm.; many coarse distinct mottles colored yellowish brown (10 yr 5/4 unrubbed); extending to 239 cm.;
		Remarks: B/C boundary not encountered sampling terminated at 330 cm; Monolith preserved (0-330 cm).

Locality: 40

SOIL CLASSIFICATION: Typic Argiudoll
PEDON NO,: 40
LOCATION: In the NW 1/4 NE 1/4, Sec. 10, T38N, R22W, Hickory County, MO.
SLOPE (%): 0-2
GEOMORPHIC SURFACE: T-1 (?)
LANDFORM: Floodplain toeslope
ELEVATION: 710 ft. (216.6 m)
NATURAL VEGETATION: Bottomland prairie (?)
PARENT MATERIAL: Alluvium
COLLECTED BY: D. L. Johnson and M. V. Miller, June 17, 1976
DESCRIBED BY: D. L. Johnson and M. V. Miller, Summer, 1976

HORIZON	DEPTH(cm)	SOIL DESCRIPTION
Ap	0 - 15	Very dark brown (10 yr 2/2 moist; 10 yr 4/1 dry) silty clay loam; very weak medium to coarse platy; friable; pH 5.8; abrupt smooth boundary to:
A_{1b}	15 - 43	Black (10 yr 2/1 moist; 10 yr 4/1 dry) silty clay loam; strong fine to medium prismatic breaking out to strong medium subangular blocky; friable; pH 6.2; gradual wavy boundary to:
B_{21tb}	43 - 69	Very dark gray brown (10 yr 3/2 moist; 10 yr 5/1 dry) silty clay; strong medium prismatic breaking out to strong medium subangular blocky; very friable; pH 6.3; weak clay skins; gradual wavy boundary to:
B_{22tb}	69 - 119	Very dark gray brown (10 yr 3/2 moist; 10 yr 5/2 dry) silty clay loam to silt loam; strong medium prismatic breaking out to strong medium subangular blocky; firm; pH 6.5;
		Remarks: B/C boundary not encountered, sampling terminated at 119 cm. Monolith preserved (0-119 cm.).

Locality: 41

SOIL CLASSIFICATION: Typic Hopludoll
PEDON NO,: 41
LOCATION: In the NW 1/4 NE 1/4, Sec. 10, R22W, T38N, Hickory County, MO.
SLOPE (%): 2-4
GEOMORPHIC SURFACE: T-1(?)
LANDFORM: Toeslope
ELEVATION: 710 ft. (216.6 m)
NATURAL VEGETATION: Bottomland prairie (?)
PARENT MATERIAL: Alluvium
COLLECTED BY: D. L. Johnson and M. V. Miller, June 17, 1976
DESCRIBED BY: D. L. Johnson and M. V. Miller, Summer, 1976

HORIZON	DEPTH(cm)	SOIL DESCRIPTION
Ap	0 - 17	Dark brown (10 yr 3/3 moist; 10 yr 5/2 dry) silt loam; weak fine platy; friable; pH 6.2; abrupt smooth boundary to:
A_{12}	17 - 36	Dark brown (10 yr 3/3 moist; 10 yr 5/2 dry) silt loam; weak medium subangular blocky; friable; pH 6.2; gradual wavy boundary to:
A_3	36 - 53	Dark yellowish Brown (10 yr 3/4 moist; 10 yr 5/2 dry) silt loam weak medium subangular blocky; friable; pH 6.15 silans appear at 38 cm. and continue to bottom of sample; gradual wavy boundary to:
B_1	53 - 61	Dark brown (10 yr 4/3 moist; 10 yr 5/2 dry) silt loam; weak medium to coarse subangular blocky; friable; pH 6.1 Illuvial surfaces; gradual wavy boundary to:
B_2	61 - 119	Dark brown (10 yr 4/3 moist; 10 yr 6/3 dry)silt loam; weak medium subangular blocky; friable; pH 6.2; silans; weak clay skins;
		Remarks: Sampling terminated at 119 cm. Monolith preserved (0-244 cm).

Locality: 42

SOIL CLASSIFICATION: Typic Paleudalf
PEDON NO.: 42
LOCATION: In the SW 1/4 NE 1/4, Sec.10, T38N, R22W, Hickory County, MO.
SLOPE(%): 8-10
GEOMORPHIC SURFACE: T-2(?) OR T-3(?)
LANDFORM: Footslope
ELEVATION: 740 ft. (225.7 m)
NATURAL VEGETATION: Deciduous forest
PARENT MATERIAL: Alluvium - colluvium
COLLECTED BY: D. L. Johnson and M. V. Miller, June 17, 1976.
DESCRIBED BY: D. L. Johnson and M. V. Miller, Summer, 1976.

HORIZON	DEPTH(cm)	SOIL DESCRIPTION
Ap	0 - 18	Dark brown (10 yr 4/3 moist; 10 yr 6/3 dry) silt loam; weak fine to medium platy; friable; pH 6.2; few fine faint mottles colored strong brown (7.5 yr 5/6 unrubbed) to gray (10 yr 6/1 unrubbed); faint manganese film and a few manganese concentrations; abrupt smooth boundary to:
B_1	18 - 28	Brown (7.5 yr 4/4 moist; 10 yr 7/3 dry) silt loam; weak fine to medium subangular blocky; friable; pH 6.0 faint manganese film and a few manganese concentrations; few medium faint to distinct mottles colored strong brown (7.5 yr 5/6 unrubbed) to gray (10 yr 6/1 unrubbed); clear wavy boundary to:
B_{21}	28 - 42	Strong brown (7.5 yr 5/6 moist; 10 yr 6/4 dry) silty clay loam; strong fine to medium subangular blocky; friable; pH 5.5 weak clay skins; faint manganese film and a few manganese concentrations; common medium faint to distinct mottles colored strong brown (7.5 yr 5/6 unrubbed) to gray (10 yr 6/1 unrubbed); clear wavy boundary to:
B_{22t}	42 - 51	Yellowish brown (10 yr 5/6 moist; 10 yr 6/4 dry) silty clay loam; strong medium subangular blocky; friable ; pH 5.5 moderate clay skins; faint manganese film and a few manganese concentrations; common medium faint to distinct mottles colored strong brown (7.5 5/6 unrubbed) to gray (10 yr 6/1 unrubbed); clear smooth boundary to:
B_{23t}	51 - 119	Yellowish brown (10 yr 5/6 moist; 10 yr 6/4 dry) silty clay loam; weak to moderate medium prismatic; firm to friable; pH 5.5; well developed clay skins decreasing with depth; faint manganese films and a few manganese concretions; many coarse prominent mottles colored strong brown (7.5 yr 5/6 unrubbed) to gray (10 yr 6/1 unrubbed);
		Remarks: Sampling terminated at 119 cm; monolith preserved (0-244 cm).

Locality: 43

SOIL CLASSIFICATION: Typic Hapluquept
PEDON NO,: 43
LOCATION: In the SW 1/4 NE 1/4, Sec. 15, T38N, R22W, Hickory County, MO.
SLOPE (%): 0-2
GEOMORPHIC SURFACE: T-1
LANDFORM: Toeslope
ELEVATION: 710 ft. (216.6 m)
NATURAL VEGETATION: Deciduous forest
PARENT MATERIAL: Alluvium
COLLECTED BY: D. L. Johnson and M. V. Miller, June 18, 1976
DESCRIBED BY: D. L. Johnson and M. V. Miller, Summer, 1976

HORIZON	DEPTH(cm)	SOIL DESCRIPTION
Ap	0 - 20	Very dark gray brown (10 yr 3/2 moist; 10 yr 5/2 dry) silt loam; weak medium to coarse platy; friable; pH 5.8 silans present; few fine faint mottles colored yellowish brown (10 yr 5/8 unrubbed); abrupt smooth boundary to:
A_3	20 - 37	Very dark gray brown (10 yr 3/2 moist; 10 yr 5/1 dry) silt loam; moderate medium subangular blocky; friable; pH 5.9 silans; few fine faint mottles colored yellowish brown (10 yr 5/8 unrubbed; distinctness wavy boundary to:
B_{21}	37 - 91	Very dark gray brown (10 yr 3/2 moist; 10 yr 5/1 dry) silty clay loam; weak medium to coarse subangular blocky; friable to firm; pH 6.1; silans; very weak to weak clay skins; few fine faint mottles colored yellowish brown (10 yr 5/8 unrubbed); suspected crayfish burrow at 64 cm; gradual irregular boundary to:
B_{22}	91 - 119	Very dark gray brown (10 yr 3/2 moist; 10 yr 6/2 dry) silty clay loam; weak to moderate medium to coarse subangular blocky; friable to firm; pH 6.1; weak clay skins; common medium faint mottles colored yellowish brown (10 yr 5/8 unrubbed);
		Remarks: Sampling terminated at 119 cm. Monolith preserved (0-119 cm).

Locality: 44

SOIL CLASSIFICATION: Dystric Fluventic Eutrochrept
PEDON NO,: 44
LOCATION: In the SW 1/4 NE 1/4, Sec. 15, T38N, R22W, Hickory county, MO.
SLOPE (%): 0-2
GEOMORPHIC SURFACE: T-1 (b)
LANDFORM: Floodplain terrace toeslope
ELEVATION: 710 ft. (216.5 m)
NATURAL VEGETATION: Deciduous forest
PARENT MATERIAL: Alluvium
COLLECTED BY: D. L. Johnson and M. V. Miller, June 18, 1976
DESCRIBED BY: D. L. Johnson and M. V. Miller, Summer, 1976

HORIZON	DEPTH(cm)	SOIL DESCRIPTION
Ap	0 - 15	Dark brown (10 yr 3/3 moist; 10 yr 6/2 dry) silt loam; very weak fine to medium platy; friable; pH 5.9; abrupt smooth boundary to:
A_2	15 - 30	Dark yellowish brown (10 yr 3/4 moist; 10 yr 6/3 dry) silt loam; weak medium subangular blocky; friable; pH 6.0; gradual wavy boundary to:
B_1	30 - 46	Dark brown (10 yr 4/3 moist; 10 yr 6/3 dry) silt loam; weak medium subangular blocky; friable; pH 6.0; illuvial surfaces; gradual wavy boundary to:
B_2	46 - 132	Dark yellowish brown (10 yr 3/4 moist; 10 yr 6/3 dry) to dark brown (10 yr 4/3 moist) silt loam to silty clay loam; weak medium to coarse subangular blocky; friable; pH 5.9; weak clay skins, increasing with depth; sampling terminated at 239 cm.
C_1	132 - 239	Dark brown (10 yr 4/3 moist; 10 yr 5/4 dry) silt loam; weak medium to coarse subangular blocky; friable; pH 6.0; weak clay skins;
		Remarks: Sampling terminated at 239 cm. Monolith preserved (0-239 cm).

Locality: 45

SOIL CLASSIFICATION: Typic Paleudalf
PEDON NO,: 45
LOCATION: In the SW 1/4 NE 1/4 , Sec. 15, T38N, R22W, Hickory County, MO.
SLOPE (%): 1-3%
GEOMORPHIC SURFACE: T-2(?)
LANDFORM: Tributary terrace (toeslope)
ELEVATION: 700 ft. (213.5 m)
NATURAL VEGETATION: Deciduous forest
PARENT MATERIAL: alluvium
COLLECTED BY: D. L. Johnson and M. V. Miller, June 18, 1976
DESCRIBED BY: D. L. Johnson and M. V. Miller, Summer, 1976

HORIZON	DEPTH(cm)	SOIL DESCRIPTION
Ap	0 - 18	Dark brown (7.5 yr 4/2 moist; 10 yr 6/3 dry) silt loam; moderate medium platy; friable; pH 5.9; abrupt smooth boundary to:
A_2	18 - 25	Brown (7.5 yr 4/4 moist; 10 yr 5/4 dry) silt loam; weak fine subangular blocky; friable; pH 5.9; clear wavy boundary to:
B_{2t}	25 - 50	Brown (7.5 yr 4/4 moist; 10 yr 5/6 dry) silty clay loam; moderate medium subangular blocky; firm; pH 5.7;
		Remarks: Sampling terminated by cherty gravel at 50 cm depth. Monolith preserved (0-50 cm).

Locality: 50 (a)

SOIL CLASSIFICATION: Typic Paleudalf
PEDON NO.: 50
LOCATION: In the SE 1/4 SE 1/4, Sec. 15, T38N, R22W, Hickory County, MO.
SLOPE(%): 0-8
GEOMORPHIC SURFACE: T-3 (?)
LANDFORM: Remnant terrace (footslope)
ELEVATION: 720 ft. (219.6 m)
NATURAL VEGETATION: Deciduous forest
PARENT MATERIAL: Alluvium
COLLECTED BY: D. L. Johnson and M. V. Miller, June 18, 1976
DESCRIBED BY: D. L. Johnson and M. V. Miller, Summer, 1976

HORIZON	DEPTH(cm)	SOIL DESCRIPTION
A_1	0 - 3	Dark brown (7.5 yr 4/2 moist; 10 yr 6/4 dry) silt loam; single grain; loose; PH 5.7; abrupt smooth boundary to:
A_2	3 - 23	Brown (7.5 yr 4/4 moist; 10 yr 6/4 dry) silt loam; weak fine to medium platy; friable; pH 5.7; clear smooth boundary to:
A_3	23 - 28	Reddish brown (5 yr 4/4 moist; 7.5 yr 6/4 dry) silt loam; weak fine subangular blocky; friable; pH 5.6; clear wavy boundary to:
B_1	28 - 41	Reddish brown (5 yr 4/4 moist; 7.5 yr 6/4 dry) silt loam; weak fine subangular blocky; firm; pH 5.5; some chert pebbles; clear wavy boundary to:
B_{21t}	41 - 71	Yellowish red (5 yr 4/6 moist; 7.5 yr 6/6 dry) silty clay loam; moderate fine to medium subangular blocky; firm; pH 5.5; small faint pellets of manganese, increase in size and amount with depth; chert pebbles; common medium faint mottles colored yellowish red (5 yr 4/8 moist); clear wavy boundary to:
B_{22}	71 - 94	Yellowish red (5 yr 5/6 moist; 5 yr 5/6 dry) loam; weak medium subangular blocky; firm; pH 5.6; manganese pellets; chert pebbles; many medium distinct mottles colored yellowish red (5 yr 4/8 moist); gradual wavy boundary to:
B_{31}	94 - 117	Yellowish red (5 yr 4/8 moist; 5 yr 5/6 dry) loam; weak medium to coarse subangular blocky; firm; pH 5.9; manganese pellets; chert pebbles; many coarse prominent mottles colored red (2.5 yr 4/8 unrubbed) and reddish yellow (7.5 yr 6/6 unrubbed); clear wavy boundary to:
A'_2	117 - 163	Yellowish red (5 yr 4/8 moist; 5 yr 6/6 dry) loam; strong coarse to very coarse platy; friable; pH 5.4; clay skins; scattered chert pebbles; many coarse prominent mottles colored red (2.5 yr 4/8 unrubbed) and brown (7.5 yr 5/4 rubbed); clear wavy boundary to:

(CONTINUED)

Locality: 50 (b)

SOIL CLASSIFICATION:
PEDON NO,:
LOCATION:

GEOMORPHIC SURFACE:
LANDFORM
ELEVATION
NATURAL VEGETATION:
PARENT MATERIAL:
COLLECTED BY: D. L. Johnson and M. V. Miller,
DESCRIBED BY: D. L. Johnson and M. V. Miller,

HORIZON	DEPTH(cm)	SOIL DESCRIPTION
B^{1}_{2t}	163 - 262	Yellowish red (5 yr 4/8 moist; 10 yr 6/6 dry) clay loam; structureless massive; firm to friable; pH 5.6; scattered chert pebbles; clay skins; many coarse prominent mottles colored brown (7.5 yr 5/4 moist) decreasing in prominence at 190 cm. Remarks: Sampling terminated at 262 cm. Monolith preserved (0-119 cm).

Locality: 51

SOIL CLASSIFICATION: Typic Udifluvent$_1$
PEDON NO,: 51
LOCATION: In the SE 1/4, Sec. 15, T38N, R22W, Hickory County, MO.
SLOPE (%): 0-2
GEOMORPHIC SURFACE: T-0 (b)
LANDFORM: Floodplain toeslope
ELEVATION: 700 ft. (213.5 m)
NATURAL VEGETATION: Deciduous forest
PARENT MATERIAL: Alluvium
COLLECTED BY: D. L. Johnson and M. V. Miller, June 18, 1976
DESCRIBED BY: D. L. Johnson and M. V. Miller, Summer, 1976

HORIZON	DEPTH(cm)	SOIL DESCRIPTION
A_1	0 - 18	Very dark gray brown (10 yr 3/2 moist; 10 yr 5/1 dry) silt loam; structureless massive; firm; pH 6.9; abrupt smooth boundary to:
C_1	18 - 76	Very dark gray brown (10 yr 3/2 moist; 10 yr 5/1 dry) silt loam; weak medium to coarse subangular blocky; friable; pH 6.9; prominent evidence of alluvial stratification (silt bands at 30 and 56 cm; sand band at 76 cm.); abrupt smooth boundary to:
C_2	76 - 119	Very dark gray brown (10 yr 3/2 moist; 10 yr 5/2 dry) silt loam; weak medium to coarse subangular blocky; friable; pH 6.8; evidence of stratification absent or very slight; slight evidence of illuviation.
		Remarks: Sampling terminated at 119 cm; monolith preserved (0-119 cm).

Locality: 52

SOIL CLASSIFICATION: Dystric Fluventic Eutrochrept
PEDON NO.: 52
LOCATION: In the SE 1/4, SE 1/4, Sec. 15, T38N, R22W, Hickory County, MO.
SLOPE (%): 0-2
GEOMORPHIC SURFACE: T-1 (b)
LANDFORM: Terrace-toeslope
ELEVATION: 710 ft. (216.6 m)
NATURAL VEGETATION: Deciduous forest
PARENT MATERIAL: Alluvium
COLLECTED BY: D. L. Johnson and M. V. Miller, June 18, 1976
DESCRIBED BY: D. L. Johnson and M. V. Miller, Summer, 1976

HORIZON	DEPTH(cm)	SOIL DESCRIPTION
A_1	0 - 20	Dark brown (10 yr 3/3 moist; 10 yr 6/2 dry) loam; weak medium subangular blocky; friable; pH 6.1; abundant roots in top 5 cm; clear wavy boundary to:
A_2	20 - 46	Dark brown (7.5 yr 4/2 moist; 10 yr 5/3 dry) loam; weak fine to medium subangular blocky; friable; pH 6.2; gradual irregular boundary to:
B_1	46 - 72	Dark brown (10 yr 3/3 moist; 10 yr 5/4 dry) loam; weak medium subangular blocky; friable; pH 6.2; clear wavy boundary to:
B_2	72 - 119	Dark yellowish brown (10 yr 3/4 moist; 10 yr 5/4 dry) silt loam; weak medium to coarse subangular blocky; friable; pH 6.2;
		Remarks: Sampling terminated at 119 cm. Monolith preserved (0-119 cm).

Locality: 55

SOIL CLASSIFICATION: Typic udifluvent
PEDON NO.: 55
LOCATION: In the NE 1/4 SE 1/4, Sec. 15, T38N, R22W, Hickory county, MO.
SLOPE (%): 0-3
GEOMORPHIC SURFACE: T-0 (a)
LANDFORM: Floodplain toeslope
ELEVATION: 700 ft. (213.5 m)
NATURAL VEGETATION: Deciduous forest
PARENT MATERIAL: Alluvium
COLLECTED BY: D. L. Johnson and M. V. Miller, June 21, 1976
DESCRIBED BY: D. L. Johnson and M. V. Miller, Summer, 1976

HORIZON	DEPTH(cm)	SOIL DESCRIPTION
Ap	0 - 15	Dark brown (10 yr 3/3 moist; 10 yr 4/3 dry) silt loam; weak coarse platy; friable; pH 6.2; abrupt smooth boundary to:
C_1	15 - 56	Very dark gray brown (10 yr 3/2 moist; 10 yr 5/2 dry) silt loam; weak medium to coarse subangular blocky; friable; pH 6.6; gradual irregular to wavy boundary to:
C_2	56 - 119	Very dark gray brown (10 yr 3/2 moist; 10 yr 5/2 dry) silt loam; weak medium subangular blocky; friable; pH 6.6; incipient illuvial surfaces present.
		Remarks: Sampling terminated at 119 cm.

Locality: 56

SOIL CLASSIFICATION: Dystric Fluventic Eutrochrept
PEDON NO.: 56
LOCATION: In the NE 1/4 SE 1/4, Sec. 15, T38N, R22W, Hickory County, MO.
SLOPE (%): 0-3
GEOMORPHIC SURFACE: T-1 (b)
LANDFORM: Terrace - toeslope
ELEVATION: 710 ft. (216.6 m)
NATURAL VEGETATION: Deciduous forest
PARENT MATERIAL: Alluvium
COLLECTED BY: D. L. Johnson and M. V. Miller, June 21, 1976
DESCRIBED BY: D. L. Johnson and M. V. Miller, Summer, 1976

HORIZON	DEPTH(cm)	SOIL DESCRIPTION
Ap	0 - 18	Dark brown (10 yr 3/3 moist; 10 yr 5/2 dry) silt loam; moderate fine to medium platy; friable; pH 6.2; roots plentiful in top 1 cm.; abrupt smooth boundary to:
A_3	18 - 36	Dark brown (10 yr 3/3 moist; 10 yr 5/2 dry) silt loam; weak fine to medium subangular blocky; friable; pH 6.25; clear wavy boundary to:
B_2	36 - 119	Dark brown (10 yr 3/3 moist; 10 yr 5/3 dry) silt loam; weak medium to coarse subangular blocky; friable; pH 6.3; weak clay skins; gradual irregular boundary to:
		Remarks: Sampling terminated at 119 cm. Monolith preserved (0-119 cm).

Locality: 57

SOIL CLASSIFICATION: Typic Albaqualf
PEDON NO,: 57
LOCATION: In the NE 1/4, SE 1/4 Sec. 15, T38N, R22W, Hickory County, MO.
SLOPE (%): 1-4
GEOMORPHIC SURFACE: T-2
LANDFORM : Toeslope
ELEVATION : 710 ft. (216.6 m)
NATURAL VEGETATION: Deciduous forest
PARENT MATERIAL: Alluvium
COLLECTED BY: D. L. Johnson and M. V. Miller, June 21, 1976
DESCRIBED BY: D. L. Johnson and M. V. Miller, Summer, 1976

HORIZON	DEPTH(cm)	SOIL DESCRIPTION
Ap	0 - 15	Brown (10 yr 4/3 moist; 10 yr 6/3 dry) silt loam; weak fine to coarse platy; friable; pH 5.7; roots abundant in top 4 cm.; clear smooth boundary to:
A_2	15 - 25	Dark brown (7.5 yr 4/2 moist; 10 yr 6/2 dry) silt loam; weak fine to coarse platy; friable; pH 5.7; clear wavy boundary to:
A_3	25 - 56	Brown (10 yr 4/3 moist; 10 yr 5/3 dry) silt loam; weak medium subangular blocky; friable; pH 5.9; clear wavy boundary to:
B_{2t}	56 - 150	Brown to dark yellowish brown (10 yr 4/3 moist to 10 yr 4/4 moist; 10 yr 5/3 dry); silt loam to clay loam; weak to moderate medium to coarse subangular blocky; friable; pH 6.0; weak clay skins; clear wavy boundary to:
B_3	150 - 238	Dark yellowish brown (10 yr 4/4 moist; 10 yr 5/3 dry) clay loam; weak to moderate coarse subangular blocky; friable; pH 6.1; very weak clay skins; small amounts of manganese appear at 213 cm.; pebble (20 x 15 cm.) found at 213 cm.;
		Remarks: Sampling terminated at 238 cm. Monolith preserved (0-244cm).

Locality: 58

SOIL CLASSIFICATION: Typic Albaqualf
PEDON NO.: 58
LOCATION: In the Se 1/4, Sec. 15, T38N, R22W, Hickory County, MO.
SLOPE (%): 1-4
GEOMORPHIC SURFACE: T-2
LANDFORM: Toeslope
ELEVATION: 710 ft. (216.6 m)
NATURAL VEGETATION: Deciduous forest
PARENT MATERIAL: Alluvium
COLLECTED BY: D. L. Johnson and M. V. Miller, June 21, 1976
DESCRIBED BY: D. L. Johnson and M. V. Miller, Summer, 1976

HORIZON	DEPTH(cm)	SOIL DESCRIPTION
Ap	0 - 15	Dark gray brown (10 yr 4/2 moist; 10 yr 7/2 dry) silt loam; weak fine to medium platy; friable; pH 5.7;abrupt smooth boundary to:
A_{12}	15 - 24	Brown (10 yr 4/3 moist; 10 yr 7/2 dry) silt loam; moderate medium to coarse platy; friable; pH 5.9; abrupt smooth boundary to:
A_{2g}	24 - 42	Gray brown (10 yr 5/2 moist; 10 yr 7/1 dry) silt loam; weak medium subangular blocky; friable; pH 5.5; many manganese nodules up to 1 cm. thick; clear wavy boundary to:;
B_{1g}	42 - 56	Brown (10 yr 5/3 moist; 10 yr 6/1 dry) silty clay loam; strong fine subangular blocky; friable pH 5.5; prominent thick silans on ped surfaces; common manganese nodules; clear wavy boundary to:
B_{2tg}	56 - 150	Dark gray brown (10 yr 4/2 moist; 10 yr 5/3 dry) to olive brown (2.5 Y 4/4 moist) silty clay loam; structureless massive to weak medium to coarse subangular blocky to strong medium to coarse platy; firm;pH 5.8; thick clay skins; common manganese nodules; common medium faint to distinct mottles colored yellowish brown (10 yr 5/4 moist) and many coarse prominent mottles colored yellowish brown (10 yr 5/6) to strong brown (7.5 yr 5/6); abrupt smooth boundary to:
B_{3g}	150 - 180	Dark gray brown (10 yr 4/2 moist; 10 yr 6/3 dry) sandy loam; structureless massive; firm; pH 6.5; well formed clay skins; abrupt smooth boundary to:
	180 - ?	Remarks: Sampling terminated at 180 cm. where chert gravels in a sandy loam matrix were encountered. Monolith preserved (0-119 cm).

Locality: 59

SOIL CLASSIFICATION: Typic Paleudalf
PEDON NO,: 59
LOCATION: In the NW 1/4 SE 1/4, Sec. 15, T38N, R22W, Hickoyr County, MO.
SLOPE (%): 6-10
GEOMORPHIC SURFACE: T-3 (?)
LANDFORM: Footslope
ELEVATION: 720 ft. (219.6 m)
NATURAL VEGETATION: Deciduous forest
PARENT MATERIAL: Alluvium - colluvium?
COLLECTED BY: D. L. Johnson and M. V. Miller, June 21, 1976
DESCRIBED BY: D. L. Johnson and M. V. Miller, Summer, 1976

HORIZON	DEPTH(cm)	SOIL DESCRIPTION
Ap	0 - 17	Dark gray brown (10 yr 4/2 moist; 10 yr 6/3 dry) silt loam; moderate fine to coarse platy; friable; pH 6.3; small manganese nodules; abrupt smooth boundary to:
A_{12}	17 - 22	Dark gray brown (10 yr 4/2 moist; 10 yr 6/3 dry) silt loam; weak medium subangular blocky; friable; pH 6.1 small manganese nodules; clear wavy boundary to:
A_2	22 - 43	Brown (10 yr 5/3 moist; 10 yr 6/3 dry) silt loam; weak medium subangular blocky; friable; pH 6.15 small manganese nodules; few fine faint mottles colored yellowish red (5 yr 4/6 moist) clear wavy boundary to:
B_1	43 - 61	Brown (10 yr 5/3 moist; 10 yr 7/2 dry) silt loam; moderate fine to medium subangular blocky; friable; pH 6.4; manganese nodules; common fine faint to distinct mottles colored yellowish red (5 yr 4/6 moist); clear irregular boundary to:
B_{21t}	61 - 86	Brown (7.5 yr 4/4 moist; 10 yr 6/4 dry) silty clay loam; weak medium to coarse subangular blocky; firm; pH 6.0; manganese nodules; common medium distinct mottles colored yellowish red (5 yr 4/6 moist); clear wavy boundary to:
B_{22t}	86 - 147	Brown (7.5 yr 4/4 moist; 10 yr 5/4 dry) to dark yellowish brown (10 yr 4/4 moist) silty clay loam; moderate to strong medium to very coarse platy; firm; pH 5.8; manganese nodules; many coarse distinct mottles colored yellowish red (5 yr 4/6 moist); gradual wavy boundary to:
B_3	147 - 259	Dark brown (10 yr 4/3 moist; 10 yr 5/6 dry) to yellowish brown (10 yr 5/4 moist) silt loam; structureless massive to weak medium subangular blocky; firm; pH 6.3; manganese with bluish irridescent color covers ped surfaces from 216 cm. To 234 cm; many coarse distinct mottles colored brown (7.5 yr 4/4 unrubbed) to gray (10 yr 5/1 unrubbed);
		Remarks; Sampling terminated at 259 cm. Monolith preserved (0-119 cm).

Locality: 60

SOIL CLASSIFICATION: Typic Argiudoll
PEDON NO.: 60
LOCATION: In the SE 1/4, NW 1/4, Sec. 33, T39N, R22W, Benton County, MO.
SLOPE (%): 2-4
GEOMORPHIC SURFACE: T-1 (b)
LANDFORM: Terrace-footslope
ELEVATION: 800 ft. (244 m)
NATURAL VEGETATION: Deciduous forest
PARENT MATERIAL: Alluvium - colluvium
COLLECTED BY: D. L. Johnson and N. V. Miller, June 21, 1976.
DESCRIBED BY: D. L. Johnson and N. V. Miller, Summer, 1976

HORIZON	DEPTH(cm)	SOIL DESCRIPTION
A_{11}	0 - 4	Dark brown (7.5 yr 3/2 moist; 10 yr 5/3 dry) silt loam; weak very fine to fine granular; friable; pH 6.4; abrupt smooth boundary to:
A_{12}	4 - 13	Dark brown (7.5 yr 3/2 moist; 10 yr 5/3 dry) silt loam; weak fine platy; friable; pH 6.4; abrupt smooth boundary to:
A_{13}	13 - 48	Dark brown (7.5 3/2 moist; 10 yr 5/3 dry) silt loam; weak medium subangular blocky; friable; pH 6.2; clear wavy boundary to:
B_1	48 - 58	Dark brown (7.5 yr 3/2 moist; 10 yr 5/2 dry) silt loam; moderate medium subangular blocky; friable; pH 6.2; weak clay skins; clear wavy boundary to:
B_{21t}	58 - 91	Very dark gray brown (10 yr 3/2 moist; 10 yr 4/2 dry) silty clay loam; moderate medium subangular blocky; firm to friable; pH 6.0; well developed clay skins; gradual irregular boundary to:
B_{22t}	91 - 119	Dark brown (7.5 yr 3/2 moist; 10 yr 4/3 dry) silty clay loam; weak medium to coarse subangular blocky; firm to friable; pH5.9; well developed clay;
		Remarks: Sampling terminated at 119 cm. Monolith preserved (0-244 cm).

Locality: 61 A

SOIL CLASSIFICATION: Dystric Fluventic Eutrochrept
PEDON NO,: 61 A
LOCATION: In the NW 1/4 NW 1/4, Sec. 3, T38N, R22W, Benton County, MO.
SLOPE (%): 1-3
GEOMORPHIC SURFACE: T-1 (b)
LANDFORM: Terrace-toeslope
ELEVATION: 680 ft. (207.4 m)
NATURAL VEGETATION: Deciduous forest
PARENT MATERIAL: Alluvium
COLLECTED BY: D. L. Johnson and M. V. Miller, June 21, 1976
DESCRIBED BY: D. L. Johnson and M. V. Miller, Summer, 1976

HORIZON	DEPTH(cm)	SOIL DESCRIPTION
Ap	0 - 20	Dark brown (10 yr 3/3 moist; 10 yr 6/3 dry) silt loam; very weak medium platy breaking out to weak fine to medium subangular blocky; friable pH 6.0; abrupt smooth boundary to:
B_1	20 - 64	Dark brown (10 yr 3/3 moist; 10 yr 6/3 dry) silt loam; weak to moderate medium to coarse subangular blocky; friable; pH 6.2; weak illuvial surfaces; few poorly develcped silans; gradual wavy boundary to:
B_2	64 - 213	Dark yellowish brown (10 yr 3/4 moist; 10 yr 5/4 dry) silty clay loam; weak to moderate medium to coarse subangular blocky; friable; pH 6.3; clay skins; few poorly developed silans; clear wavy boundary to:
$IIIB_3$	213 - 239	Dark brown (10 yr 3/3 moist; 10 yr 6/3 dry) silt loam; structureless single grain (213 cm.-224 cm.) to very weak coarse subangular blocky; friable; pH 6.0; no clay skins or silans;
		Remarks: Sampling terminated at 239 cm. Monolith preserved (0-244 cm). Texturally, this pedon lies at the Alfisol-Inceptisol boundary.

Locality: 61 B

SOIL CLASSIFICATION: Typic Albaqualf
PEDON NO,: 61 B
LOCATION: In the NW 1/4 NW 1/4, Sec. 3, T38N, R22W, Benton County, MO.
SLOPE (%): 2-4
GEOMORPHIC SURFACE: T-1(a)?
LANDFORM: Toeslope
ELEVATION: 690 ft. (210.5m)
NATURAL VEGETATION: Deciduous forest
PARENT MATERIAL: Alluvium
COLLECTED BY: D. L. Johnson and M. V. Miller, June 21, 1976
DESCRIBED BY: D. L. Johnson and M. V. Miller, Summer, 1976

HORIZON	DEPTH(cm)	SOIL DESCRIPTION
Ap	0 - 20	Dark gray brown (10 yr 4/2 moist; 10 yr 7/2 dry) silt loam; weak medium subangular blocky; friable; pH 5.8; common manganese films and nodules; few fine distinct mottles colored gray brown (10 yr 5/2 unrubbed) to yellowish brown (10 yr 5/8 unrubbed); abrupt smooth boundary to:
A_{2g}	20 - 30	Brown (10 yr 5/3 moist; 10 yr 7/2 dry) silt loam; weak medium subangular blocky; friable; pH 5.7; abundant silans; common manganese films and nodules; common medium distinct mottles colored gray brown (10 yr 5/2 unrubbed) to yellowish brown (10 yr 5/8 unrubbed); clear irregular boundary to:
B_{21g}	30 - 51	Yellowish brown (10 yr 5/4 moist; 10 yr 6/3 dry) silt loam; strong fine to medium subangular blocky; friable; pH 5.5; weak illuvial surfaces; abundant silans; common manganese films and nodules; common medium distinct mottles colored gray brown (10 yr 5/2 unrubbed) to yellowish brown (10 yr 5/8 unrubbed); gradual irregular boundary to:
B_{22tg}	51 - 102	Yellowish brown (10 yr 5/4 moist; 10 yr 6/4 dry) silt loam; moderate medium to coarse subangular blocky; firm to friable; pH 5.2; moderate clay skins; silans extend to 58 cm.; common manganese films and nodules; many coarse prominent mottles colored gray brown (10 yr 5/2 unrubbed) to yellowish brown (10 yr 5/8 unrubbed); gradual irregular boundary to:
B_{3g}	102 - ?	Pale brown (10 yr 6/3 moist; 10 yr 6/4 dry) silt loam; weak coarse platy breaking out to weak medium to coarse subangular blocky; friable; pH 6.5; moderate clay skins; common manganese films and nodules; many coarse prominent mottles colored gray brown (10 yr 5/2 unrubbed) to yellowish brown (10 yr 5/8 unrubbed); large chert pebble at 107 cm.;
		Remarks: Sampling terminated at 119 cm.

Locality: 62

SOIL CLASSIFICATION: Typic Albaqualf
PEDON NO,: 62
LOCATION: In the NW 1/4 NW 1/4 sec. 3, T38N, R22W, Benton County, MO.
SLOPE (%): 4-6
GEOMORPHIC SURFACE: T-2 (?)
LANDFORM: Toeslope
ELEVATION: 700 ft. (213.5 m)
NATURAL VEGETATION: Deciduous forest
PARENT MATERIAL: Alluvium
COLLECTED BY: D. L. Johnson and M. V. Miller, June 21, 1976
DESCRIBED BY: D. L. Johnson and M. V. Miller, Summer, 1976

HORIZON	DEPTH(cm)	SOIL DESCRIPTION
Ap	0 - 18	Brown (10 yr 4/3 moist; 10 yr 6/3 dry) silt loam; weak medium to coarse platy; friable; pH 5.8; abrupt smooth boundary to:
A_{21g}	18 - 28	Gray brown (10 yr 5/2 moist; 10 yr 7/2 dry) silt loam; weak to moderate fine to medium platy; friable; pH 5.8; common fine distinct mottles colored gray (10 yr 5/1 unrubbed) to yellowish brown (10 yr 5/6 unrubbed); abrupt smooth boundary to:
A_{22g}	28 - 44	Yellowish brown (10 yr 5/4 moist; 10 yr 7/2 dry) silty clay loam, strong fine to medium subangular blocky to angular blocky; friable; pH 5.7; common fine distinct to many coarse prominent mottles colored gray (10 yr 5/1 unrubbed) to yellowish - brown (10 yr 5/6 unrubbed); abrupt wavy boundary to:
B_{2tg}	44 - 58	Yellowish brown (10 yr 5/4 moist; 10 yr 6/3 dry) clay; weak coarse subangular blocky; firm; pH 5.5; weak to moderately developed clay skins; many coarse prominent mottles colored gray (10 yr 5/1 unrubbed) to yellowish brown (10 yr 5/6 unrubbed), diminishing with depth; clear wavy boundary to:
B_{3g}	58 - 119	Yellowish brown (10 yr 5/4 moist; 10 yr 5/4 dry) silty clay loam to clay loam; structureless massive; firm; pH 5.6;
		Remarks: Sampling terminated at 119 cm. Monolith preserved (0-119 cm).

Locality: 63 (a)

SOIL CLASSIFICATION: Typic Fraglaqalf
PEDON NO,: 63 (a)
LOCATION: In the NW 1/4 NW 1/4, Sec. 3, T38N, R22W, Benton County, MO.
SLOPE (%): 6-8
GEOMORPHIC SURFACE: T-2
LANDFORM: Upper toeslope
ELEVATION: 710 ft. (216.6 m)
NATURAL VEGETATION: Deciduous forest
PARENT MATERIAL: Alluvium
COLLECTED BY: D. L. Johnson and M. V. Miller, June 21, 1976
DESCRIBED BY: D. L. Johnson and M. V. Miller, Summer, 1976

HORIZON	DEPTH(cm)	SOIL DESCRIPTION
Ap	0 - 22	Brown (10 yr 4/3 moist; 10 yr 6/3 dry) silt loam; weak fine to medium platy; friable; pH 6.0; abrupt smooth boundary to:
A_{12}	22 - 43	Dark gray brown (10 yr 4/2 moist; 10 yr 7/2 dry) silt loam; moderate fine to medium platy; friable; pH 5.95; small manganese nodules; few fine faint mottles colored gray (10 yr 6/1 unrubbed) to yellowish brown (10 yr 5/6 unrubbed) appear at 38 cm.; abrupt smooth boundary to:
B_2	43 - 56	Brown (10 yr 5/3 moist; 10 yr 7/2 dry) silt loam; weak to moderate fine to medium subangular blocky; friable; pH 5.9; manganese nodules; few fine faint mottles colored gray (10 yr 6/1unrubbed); to yellowish brown (10yr 5/6 unrubbed); clear wavy boundary to:
A'_{2xg}	56 - 79	Pale brown (10 yr 6/3 moist; 10 yr 8/3 dry) silt loam; moderate fine to medium subangular blocky; friable to brittle in place; pH 5.8; some silans; manganese nodules; common fine to medium distinct mottles colored gray (10 yr 6/1 unrubbed) to yellowish brown (10 yr 5/6 unrubbed); mottles somewhat masked by silans; abrupt wavy boundary to:
B'_{1xg}	79 - 86	Yellowish brown (10 yr 5/4 moist; 10 yr 6/3 dry) silt loam; strong fine subangular blocky; friable; to brittle in place; pH 5.5; moderate clay skins; prominent silans completely cover ped surfaces; manganese nodules; common fine to medium distinct mottles colored gray (10 yr 6/1 unrubbed) to yellowish brown (10 yr 5/6 unrubbed); mottles masked by silans; abrupt wavy boundary to:
B_{21tg}	86 - 192	Brown (10 yr 5/3 moist; 10 yr 6/1) to yellowish brown (10 yr 5/4 moist) silty clay; structureless massive to weak medium to coarse subangular blocky; firm; PH 5.5; moderate clay skins; manganese nodules (<5 mm.); common to many medium to coarse distinct mottles colored gray (10 yr 6/1 unrubbed) to yellowish brown (10 yr 5/6 unrubbed); clear smooth boundary to:

(CONTINUED)

Locality: ~~63 (b)~~

SOIL CLASSIFICATION:
PEDON NO,:
LOCATION:

GEOMORPHIC SURFACE:
LANDFORM
ELEVATION
NATURAL VEGETATION:
PARENT MATERIAL:
COLLECTED BY: D. L. Johnson and M. V. Miller,
DESCRIBED BY: D. L. Johnson and M. V. Miller,

HORIZON	DEPTH(cm)	SOIL DESCRIPTION
B_{22tg}	192 - 206	Yellowish brown (10 yr 5/6 moist; 10 yr 6/4 dry) silty clay; weak coarse platy breaking out to strong medium angular blocky; firm; pH 6.5; manganese nodules (<10 mm.); many coarse distinct mottles colored gray (10 yr 6/1 unrubbed) to strong brown (7.5 yr 5/6 unrubbed); clear smooth boundary to:
B_{23tg}	206 - 239	Light yellowish brown (10 yr 6/4 moist; 10 yr 6/3 dry) silty clay; moderate coarse platy; firm; pH 6.5; some clay skins on horizontal ped surfaces; manganese nodules (7-10 mm.); many coarse distinct to prominent mottles colored gray (10 yr 6/1 unrubbed) to strong brown (7.5 yr 5/6 unrubbed);
		Remarks: Sampling terminated at 239 cm; monolith preserved (0-244 cm).

Locality: 64

SOIL CLASSIFICATION: Aquic Paleaqualf
PEDON NO,: 64
LOCATION: In the NW 1/4 NW 1/4, Sec. 3, T38N, R22W, Benton County, MO.
SLOPE (%): 8-10
GEOMORPHIC SURFACE: T-3 (?)
LANDFORM: Footslope
ELEVATION: 720 ft. (219.6 m)
NATURAL VEGETATION: deciduous forest
PARENT MATERIAL: Alluvium-colluvium ?
COLLECTED BY: D. L. Johnson and M. V. Miller, June 21, 1976
DESCRIBED BY: D. L. Johnson and M. V. Miller, Summer, 1976

HORIZON	DEPTH(cm)	SOIL DESCRIPTION
Ap	0 - 18	Brown (10 yr 4/3 moist; 10 yr 6/4 dry) silt loam; moderate medium to coarse platy; friable; pH 6.3; abrupt smooth boundary to:
B_1	18 - 37	Reddish brown (5yr 4/4 moist; 7.5 6/4 dry) silt loam; weak medium subangular blocky; friable; pH 6.55; weak clay skins; fine medium faint mottles colored brown (7.5 yr 4/4 moist); clear wavy boundary to:
B_{21}	37 - 53	Yellowish red (5 yr 4/6 moist; 7.5 6/4 dry) silty clay loam; moderate fine to medium subangular blocky; friable; pH 6.6; strong clay skins; manganese stains appear at 43 cm.; common medium distinct mottles colored yellowish red (5 yr 4/8 moist); clear wavy boundary to:
B_{22tg}	53 - 99	Yellowish red (5 yr 4/8 moist; 7.5 5/4 dry) silty clay loam; moderate to strong fine to medium subangular blocky; friable; pH 6.5; strong clay skins; large manganese stains; manganese nodules appear at 86 cm. many medium prominent mottles colored pinkish gray (7.5 yr 6/2 unrubbed) to dark red (2.5 yr 3/6 unrubbed); gradual wavy boundary to:
B_{23tg}	99 - 122	Yellowish red (5 yr 4/8 moist; 5 yr 5/6 dry) texture weak medium to coarse subangular blocky; friable; pH 5.5; strong clay skins; abundant manganese nodules; many medium to coarse prominant mottles colored dark red (2.5 yr 3/6 moist); sampling terminated at 122 cm.

Locality: 67

SOIL CLASSIFICATION: Typic Hapludoll
PEDON NO,: 67
LOCATION: In the NE 1/4 SE 1/4, Sec. 10, T38N, R22W, Hickory County, MO.
SLOPE (%): 4-10
GEOMORPHIC SURFACE: T-3 (?)
LANDFORM: Footslope
ELEVATION: 720 ft (219.6 m)
NATURAL VEGETATION: Deciduous forest
PARENT MATERIAL: Alluvium-colluvium
COLLECTED BY: D. L. Johnson and M. V. Miller, June 22, 1976
DESCRIBED BY: D. L. Johnson and M. V. Miller, Summer, 1976

HORIZON	DEPTH(cm)	SOIL DESCRIPTION
Ap	0 - 17	Very dark gray brown (10 yr 3/2 moist; 10 yr 5/2 dry) silt loam; weak medium platy; friable ; pH 6.7; abrupt smooth boundary to:
A_3	17 - 30	Dark brown (10 yr 3/3 moist; 10 yr 6/2 dry) silt loam; weak medium subangular blocky; friable; pH 6.9; clear wavy boundary to:
B_1	30 - 41	Dark yellowish brown (10 yr 3/4 moist) silt loam; moderate medium subangular blocky; firm; pH 6.9; illuvial surfaces; clear wavy boundary to:
B_{21}	41 - 66	Dark yellowish brown (10 yr 3/4 moist; 10 yr 5/3 dry) silty clay loam; moderate medium prismatic breaking out to moderate medium subangular blocky; firm; pH 6.8; weak clay skins; some manganese shot and films; few fine faint mottles colored yellowish red (5 yr 4/8 unrubbed) to brown (7.5 yr 5/4 unrubbed); clear waby boundary to:
B_{22}	66 - 99	Brown (10 yr 4/3 moist; 10 yr 5/4 dry) silty clay loam; moderate medium prismatic breaking out to moderate medium subangular blocky; firm; pH 6.8; weak clay skins; some manganese shot, nodules, and films; common medium faint to many medium distinct mottles colored yellowish red (5 yr 4/8 unrubbed) to brown (7.5 yr 5/4 unrubbed); clear wavy boundary to:
B_{23}	99 - 119	Brown (7.5 yr 4/4 moist; 10 yr 5/4 dry) silty clay loam; weak medium prismatic breaking out to weak to moderate subangular blocky; firm pH 6.9; weak clay skins; some manganese nodules and films; many coarse prominent mottles colored yellowish red (5 yr 4/8 unrubbed) to brown (7.5 yr 5/4 unrubbed);
		Remarks: Sampling terminated at 119 cm. Monolith preserved (0-119 cm).

Locality: 72

SOIL CLASSIFICATION: Dystric Fluventic Eutrochrept$_1$
PEDON NO,: 72
LOCATION: In the Se 1/4 NE 1/4, Sec. 10, T38N, R22W, Hickory County, MO.
SLOPE (%): 1-3
GEOMORPHIC SURFACE: T-1 (b)
LANDFORM: Terrace Toeslope
ELEVATION: 700 ft. (213.5 m)
NATURAL VEGETATION: Deciduous forest
PARENT MATERIAL: Alluvium
COLLECTED BY: D. L. Johnson and M. V. Miller, June 22, 1976
DESCRIBED BY: D. L. Johnson and M. V. Miller, Summer, 1976

HORIZON	DEPTH(cm)	SOIL DESCRIPTION
Ap	0 - 19	Brown (10 yr 4/3 moist; 10 yr 6/3 dry) silt loam; weak fine to medium platy; friable; pH 6.2; abrupt smooth boundary to:
A_2	19 - 34	Dark yellowish brown (10 yr 3/4 moist; 10 yr 6/2 dry) silt loam; weak to moderate fine to medium platy; friable; pH 5.25 abrupt smooth boundary to:
A_3	34 - 47	Brown (10 yr 4/3 moist; 10 yr 6/2 dry) silt loam; weak medium subangular blocky; friable; pH 6.2; clear wavy boundary to:
B_2	47 - 102	Brown (10 yr 4/3 moist; 10 yr 5/3 dry) silt loam; weak medium subangular blocky; friable; pH 5.8; weak clay skins; clear wavy boundary to:
B_3	02 - 119	Dark brown (7.5 yr 4/2 moist; 10 yr 5/3 dry) silt loam; weak medium to coarse subangular blocky; friable; pH 6.2; clay skins; few medium faint mottles colored dark gray (10 yr 4/1 unrubbed);
		Remarks: Sampling terminated at 119 cm. Monolith preserved (0-119 cm).

Locality: 73

SOIL CLASSIFICATION: Typic udifluvent$_2$
PEDON NO,: 73
LOCATION: In the Se 1/4 NE 1/4, Sec. 10, T38N, R22W, Hickory county, MO.
SLOPE (%): 0-4
GEOMORPHIC SURFACE: T-0 (a)
LANDFORM: Floodplain toeslope
ELEVATION: 680 ft. (207.4 m)
NATURAL VEGETATION: Deciduous forest
PARENT MATERIAL: alluvium
COLLECTED BY: D. L. Johnson and M. V. Miller, June 22, 1976
DESCRIBED BY: D. L. Johnson and M. V. Miller, Summer, 1976

HORIZON	DEPTH(cm)	SOIL DESCRIPTION
Ap	0 - 18	Dark brown (10 yr 3/3 moist; 10 yr 5/2 dry) silt loam; weak medium subangular blocky (moderate fine platy in top 5 cm); friable; pH 6.2; clear smooth boundary to:
A_{12}	18 - 30	Dark brown (10 yr 3/3 moist; 10 yr 5/2 dry) silt loam; weak medium subangular blocky; friable; pH 6.5; clear wavy boundary to:
C_1	30 - 48	Dark brown (10 yr 3/3 moist; 10 yr 5/2 dry) silt loam; weak medium subangular blocky; friable; pH 6.7; weak indication of translocated material; gradual irregular boundary to:
A_b	48 - 119	Very dark gray brown (10 yr 3/2 moist; 10 yr 5/1 dry) silt loam; weak medium to coarse subangular blocky; friable; pH 6.5; clay skins;
		Remarks: Sampling terminated at 119 cm. A probable buried A/C profile occurs at 48 cm depth. Monolith preserved (0-119 cm).

Locality: 74

SOIL CLASSIFICATION: Dystric Fluventic Eutrochrept$_1$
PEDON NO,: 74
LOCATION: In the NW 1/4 SE 1/4, Sec. 32, T39N, R22W, Benton County, MO.
SLOPE (%): 0-2
GEOMORPHIC SURFACE: T-1 (b)
LANDFORM: Terrace toeslope
ELEVATION: 690 ft. (210.45 m)
NATURAL VEGETATION: Deciduous forest
PARENT MATERIAL: Alluvium
COLLECTED BY: D. L. Johnson and M. V. Miller, June 26, 1976
DESCRIBED BY: D. L. Johnson and M. V. Miller, Summer, 1976

HORIZON	DEPTH(cm)	SOIL DESCRIPTION
Ap	0 - 15	Dark brown (10 yr 3/3 moist; 10 yr 6/3 dry) silt loam; weak fine to medium platy; friable; pH 6.2; few roots; abrupt smooth boundary to:
A_3	15 - 36	Dark brown (10 yr 3/3 moist; 10 yr 5/3 dry) silt loam; weak medium subangular blocky; friable; few roots; few illuvial surfaces; pH 6.3; few silans; gradual wavy boundary to:
B_2	36 - 168	Dark yellowish brown (10 yr 3/4 moist; 10 yr 5/3 dry) silt loam; moderate medium to coarse subangular blocky; friable; pH 6.4; very few roots; clay skins; silans; clear wavy boundary to:
C_1	168 - 239	Dark yellowish brown (10 yr 3/4 moist; 10 yr 5/3 dry) silt loam; weak medium to coarse subangular blocky; friable; pH 6.0; primary sand layer from 189 to 198 cm.
		Remarks: Sampling terminated at 239 cm. Monolith preserved (0-244 cm).

Locality: 75

SOIL CLASSIFICATION: Tystric Fluventic Eutrochrept$_1$
PEDON NO,: 75
LOCATION: In the NW 1/4 SE 1/4, Sec. 32, T39N, R22W, Benton County, MO.
SLOPE (%): 0-2
GEOMORPHIC SURFACE: T-1 (b)
LANDFORM: Terrace toeslope
ELEVATION : 690 ft. (210.5 m)
NATURAL VEGETATION: deciduous forest
PARENT MATERIAL: Alluvium
COLLECTED BY: D. L. Johnson and M. V. Miller, June 26, 1976
DESCRIBED BY: D. L. Johnson and M. V. Miller, Summer, 1976

HORIZON	DEPTH(cm)	SOIL DESCRIPTION
Ap	0 - 11	Dark brown (10 yr 3/3 moist; 10 yr 6/2 dry) silt loam; weak fine platy; friable; few roots; pH6.0; abrupt smooth boundary to:
A_3	11 - 28	Dark brown (10 yr 3/3 moist; 10 yr 5/3 dry) silt loam; very weak medium to coarse subangular blocky; friable; pH 5.9; few roots; very few weak silans; gradual wavy boundary to:
B_1	28 - 74	Dark brown (10 yr 3/3 moist; 10 yr 5/3 dry) silt loam to silty clay loam; weak medium to coarse subangular blocky; friable; pH 5.9; very few roots; illuvial surfaces; very few weak silans; gradual irregular boundary to:
B_2	74 - 221	Dark brown (10 yr 3/3 moist; 10 yr 5/3 dry) silty clay loam; moderate medium to coarse subangular blocky; friable; pH 5.9; very few roots; moderate clay skins; gradual wavy boundary to:
B_3	221 - 234	Dark brown (10 yr 3/3 moist; 10 yr 5/3 dry) silty clay loam; weak medium to coarse subangular blocky; friable; pH 6.0; few clay skins;
		Remarks: Sampling terminated at 234 cm. Monolith preserved (0-244 cm).

Locality: 80

SOIL CLASSIFICATION: Dystric Fluventic Eutrochrept$_2$
PEDON NO,: 80
LOCATION: In the NE 1/4 SW 1/4, Sec. 3, T38N, R22W, Benton County, MO.
SLOPE (%): 2-4
GEOMORPHIC SURFACE: T-1 (a)
LANDFORM: Terrace toeslope
ELEVATION: 710 ft. (216.6 m)
NATURAL VEGETATION: Deciduous forest
PARENT MATERIAL: alluvium
COLLECTED BY: D. L. Johnson and M. V. Miller, June 28, 1976
DESCRIBED BY: D. L. Johnson and M. V. Miller, Summer, 1976

HORIZON	DEPTH(cm)	SOIL DESCRIPTION
		Plentiful roots.
Ap	0 - 20	Dark yellowish brown (10 yr 3/4 moist; 10 yr 6/3 dry)silt loam; weak medium platy; friable; pH 5.8; abrupt smooth boundary to:
A_3	20 - 43	Dark yellowish brown (10 yr 3/4 moist; 10 yr 6/2 dry) silt loam; weak medium subangular blocky; friable; pH 6.1; plentiful roots; few weak silans; gradual wavy boundary to:
B_2	43 - 170	Dark yellowish brown (10 yr 4/4 to 3/4 moist; 10 yr 5/4 dry) silty clay loam; moderate medium to coarse subangular blocky; friable to firm; pH 5.9; few roots; weak clay skins; weak silans; pebble at 66 cm.; gradual irregular boundary to:
B_3	170 - 224	Dark yellowish brown (10 yr 3/4 moist; 10 yr 5/4 dry) silty clay loam; weak medium subangular blocky; friable; pH 6.0; weak clay skins; weak silans; gradual irregular boundary to:
C_1	224 - 302	Dark yellowish brown (10 yr 4/4 moist; 10 yr 5/4 dry) silty clay loam; structureless massive to weak medium to coarse subangular blocky; friable; pH 6.0; weak clay skins; weak silans;
		Remarks: Sampling terminated at 302 cm. Monolith preserved (0-244 cm)

Locality: 82

SOIL CLASSIFICATION: Typic Fraglaqualf
PEDON NO,: 82
LOCATION: In the NE 1/4 NW 1/4 sec. 3, T38N, R22W, Benton County, MO.
SLOPE (%): 4-6
GEOMORPHIC SURFACE: T-2
LANDFORM: Terrace toeslope
ELEVATION: 700 ft. (213.5 m)
NATURAL VEGETATION: Deciduous forest
PARENT MATERIAL: Alluvium
COLLECTED BY: D. L. Johnson and M. V. Miller, June 28, 1976
DESCRIBED BY: D. L. Johnson and M. V. Miller, Summer, 1976

HORIZON	DEPTH(cm)	SOIL DESCRIPTION
Ap	0 - 22	Brown (10 yr 4/3 moist; 10 yr 7/2 dry) silt loam; weak fine to medium platy; friable; pH 5.6; abrupt smooth boundary to:
A_{21g}	22 - 33	Brown (10 yr 4/3 moist; 10 yr 7/2 dry) silt loam; moderate fine to medium platy; friable; pH 5.7; clear smooth boundary to:
A_{22xg}	33 - 58	Brown (10 yr 5/3 moist; 10 yr 8/1 dry) silt loam; moderate fine to medium subangular blocky; very friable; to brittle in place; pH 5.5; clear irregular boundary to:
B_{1g}	58 - 84	Brown (10 yr 5/3 moist; 10 yr 8/3 dry) silty clay loam; moderate medium subangular blocky; friable; pH 5.1; weak illuvial surfaces; moderate silans; common coarse distinct mottles colored strong brown (7.5 yr 5/6 moist); clear wavy boundary to:
B_{2tg}	84 - 180	Brown (10 yr 4/3 moist; 10 yr 5/4 dry) silty clay; moderate medium to coarse subangular blocky changing at 104 cm. to moderate very coarse platy breaking out to weak coarse subangular blocky; firm; pH 5.3; moderate clay skins; moderate silans extend to 102 cm.; manganese films concretions? increasing with depth; many coarse distinct mottles colored yellowish brown (10 yr 5/8);

Remarks: Sampling terminated at 180 cm. Monolith preserved (0-180 cm).

Locality: 84

SOIL CLASSIFICATION: Typic Udifluvent$_2$
PEDON NO,: 84
LOCATION: In the NW 1/4 SE 1/4, Sec. 32, T39N, R22W, Benton County, MO.
SLOPE (%): 0-2
GEOMORPHIC SURFACE: T-0 (a)
LANDFORM: Floodplain toeslope
ELEVATION: 680 Ft. (207.4 m)
NATURAL VEGETATION: Deciduous forest
PARENT MATERIAL: Alluvium
COLLECTED BY: D. L. Johnson and M. V. Miller, June 20, 1976
DESCRIBED BY: D. L. Johnson and M. V. Miller, Summer, 1976

HORIZON	DEPTH(cm)	SOIL DESCRIPTION
A_{11}	0 - 20	Very dark gray brown (10 yr 3/2 moist; 10 yr 5/2 dry) silt loam; weak medium platy to weak medium subangular blocky; friable; pH 5.7; plentiful roots; very weak illuvial surfaces; clear wavy boundary to:
A_{12}	20 - 38	Very dark gray (10 yr 3/1 moist; 10 yr 6.2 dry) silt loam; weak medium subangular blocky; friable; pH 6.3 few roots; very weak illuvial surfaces; gradual irregular boundary to:
C_1	38 - 119	Very dark gray brown (10 yr 3/2 moist; 10 yr 5/2 dry) silt loam; weak medium subangular blocky; friable; pH 6.4; very few roots; very weak illuvial surfaces;
		Remarks: Sampling Terminated at 119 cm.

Locality: 86

SOIL CLASSIFICATION: Dystric Fluventic Eutrochrept
PEDON NO.: 86
LOCATION: In the NW 1/4 SE 1/4, Sec. 32, T39N, R22W, Benton County, MO.
SLOPE (%): 0-4
GEOMORPHIC SURFACE: T-1 (b)
LANDFORM: Terrace Toeslope
ELEVATION: 690 Ft. (210.5 m)
NATURAL VEGETATION: Deciduous forest
PARENT MATERIAL: Alluvium
COLLECTED BY: D. L. Johnson and M. V. Miller, June 30, 1976
DESCRIBED BY: D. L. Johnson and M. V. Miller, Summer, 1976

HORIZON	DEPTH(cm)	SOIL DESCRIPTION
Ap	0 - 8	Dark brown (10 yr 3/3 moist; 10 yr 6/3 dry)(0-6") silt loam; weak fine subangular blocky; friable; pH 6.0; abrupt smooth boundary to:
B_2	8 - 71	Dark brown (10 yr 3/3 to 4/3 moist; 10 yr 6/3 dry) silt loam; moderate medium subangular blocky; friable; pH 6.1; clay skins; silans; gradual irregular boundary to:
B_3	71 - 119	Dark yellowish brown (10 yr 3/4 moist; 10 yr 5/3 dry) silt loam; weak medium to coarse subangular blocky to structureless massive; friable; pH 6.2; few illuvial surfaces.
		Remarks: Sampling terminated at 119 cm. Monolith preserved (0-119 cm).

Locality: 88

SOIL CLASSIFICATION: Typic Argiudoll
PEDON NO,: 88
LOCATION: In the NE 1/4 SE 1/4, Sec. 32, T39N, R22W, Benton County, MO.
SLOPE (%): 2-4
GEOMORPHIC SURFACE: T-2 (?)
LANDFORM: Upper toeslope
ELEVATION: 690 Ft. (210.5 m)
NATURAL VEGETATION: Deciduous forest (?)
PARENT MATERIAL: Alluvium
COLLECTED BY: D. L. Johnson and M. V. Miller, June 30, 1976
DESCRIBED BY: D. L. Johnson and M. V. Miller, Summer, 1976

HORIZON	DEPTH(cm)	SOIL DESCRIPTION
Ap	0 - 22	Very dark gray brown (10 yr 3/2 moist; 10 yr 5/2 dry) silt loam; weak fine to medium platy; friable; pH 5.9; plentiful roots; abrupt smooth boundary to:
A_3	22 - 36	Black (10 yr 2/1 moist; 10 yr 5/2 dry) silt loam to silty clay loam; strong fine subangular blocky; friable; pH 6.2; few roots; clear wavy boundary to:
B_{21t}	36 - 58	Very dark brown (10 yr 2/2 moist; 10 yr 4/1 dry) silty clay loam; strong fine to medium subangular blocky; firm; pH 6.3; few roots; illuvial surfaces; clear wavy boundary to:
B_{22t}	58 - 86	Very dark brown (10 yr 2/2 moist; 10 yr 4/2 dry) silty clay loam; moderate medium to coarse subangular blocky; firm ; pH 6.2; very few roots; moderate clay skins; gradual irregular boundary to:
B_3	86 - 119	Very dark brown (10 yr 2/2 moist; 10 yr 4/2 dry) silty clay loam; weak to moderate coarse subangular blocky; firm; pH 6.3; very few roots; strong clay skins;
		Remarks: Sampling terminated at 119 cm. Monolith preserved (0-119 cm.).

No pH
No dry colors (no samples)

Locality: 89

SOIL CLASSIFICATION: Typic alliaqualf
PEDON NO,: 89
LOCATION: In the NE 1/4 SE 1/4, Sec. 32, T39N, R22W, Benton County, MO.
SLOPE (%): 1-3
GEOMORPHIC SURFACE: T-1 (b)
LANDFORM: Terrace toeslope
ELEVATION: 690 ft. (210.5 m)
NATURAL VEGETATION: Deciduous forest
PARENT MATERIAL: Alluvium
COLLECTED BY: D. L. Johnson and M. V. Miller, June 30, 1976
DESCRIBED BY: D. L. Johnson and M. V. Miller, Summer, 1976

HORIZON	DEPTH(cm)	SOIL DESCRIPTION
Ap	0 - 23	Very dark gray brown (10 yr 3/2 moist) silt loam; weak medium subangular blocky; friable; abrupt smooth boundary to:
A_{12g}	23 - 36	Dark gray (10 yr 4/1 moist) silt loam; moderate medium to coarse subangular blocky; friable; few fine faint mottles colored yellowish brown (10 yr 5/8)moist;
A_{2g}	36 - 94	Dark gray brown (10 yr 4/2 moist) to brown (10 yr 4/3 moist) silt to silt loam; weak medium to coarse subangular blocky; very friable; manganese; common medium distinct mottles colored yellowish brown (10 yr 5/8 moist) moist; clear wavy boundary to:
B_{1g}	94 - 142	Brown (10 yr 4/3 moist) silt loam; very weak to weak medium to coarse subangular blocky; friable; illuvial surfaces; silans; manganese; few medium faint mottles colored yellowish brown (10 yr 5/4 moist); clear wavy boundary to:
B_{2tg}	142 - 231	Dark brown (7.5 yr 4/2 moist) to dark yellowish brown (10 yr 3/4 moist) silty clay loam; weak medium to coarse subangular blocky; friable to firm; silans in upper 23 cm.; manganese increasing with depth; common medium to coarse prominent mottles colored yellowish brown (10 yr 5/4 moist).
		Remarks: Sampling terminated at 231 cm. Monolith preserved (0-239).

Locality: 90

SOIL CLASSIFICATION: Hapludolf
PEDON NO,: 90
LOCATION: In the NW 1/4 SE 1/4, Sec. 32, T39N, R22W, Benton County, MO.
SLOPE (%): 0-4
GEOMORPHIC SURFACE: T-1 (a) ?
LANDFORM: terrace toeslope
ELEVATION: 690 ft. (210.5 m)
NATURAL VEGETATION: Deciduous forest
PARENT MATERIAL: Alluvium
COLLECTED BY: D. L. Johnson and M. V. Miller, July 1, 1976
DESCRIBED BY: D. L. Johnson and M. V. Miller, Summer, 1976

HORIZON	DEPTH(cm)	SOIL DESCRIPTION
Ap	0 - 23	Dark brown (10 yr 3/3 moist; 10 yr 6/3 dry) silt loam; weak medium to coarse platy; friable; pH 5.6; roots abundant; clear wavy boundary to:
A_{12}	23 - 27	Dark brown (10 yr 3/3 moist; 10 yr 6/3 dry) silt loam; weak medium subangular blocky; friable; pH 6.1; roots plentiful; abrupt wavy boundary to:
A_2	27 - 46	Brown (10 yr 4/3 moist; 10 yr 6/3 dry) silt loam; weak to moderate medium subangular blocky; friable; pH 6.1; roots plentiful; silans appear at 41 cm.; gradual wavy boundary to:
B_1	46 - 61	Dark yellowish brown (10 yr 3/4 moist; 10 yr 5/4 dry) silty clay loam; weak fine to medium prismatic breaking out to moderate medium subangular blocky; friable; pH 6.1; roots plentiful; clay skins; prominent silans; clear wavy boundary to:
B_{21t}	61 - 101	Dark yellowish brown (10 yr 3/4 moist; 10 yr 6/3 dry) silty clay loam; moderate to coarse medium prismatic breaking out to moderate to coarse medium subangular blocky; firm; pH 5.4; roots plentiful; clay skins; prominent silans; abrupt smooth boundary to:
B_{22t}	101 - 119	Dark brown (10 yr 3/3 moist; 10 yr 5/3 dry) silty clay loam; weak medium subangular blocky; firm to friable; pH 5.5; few roots; clay skins; silans;
		Remarks: Sampling terminated at 119 cm. Monolith preserved (0-119 cm).

Locality: 91

SOIL CLASSIFICATION: Typic Hapludoll
PEDON NO,: 91
LOCATION: In the NE 1/4 SW 1/4, Sec. 32, T39N, R22W, Benton County, MO.
SLOPE (%): 4-6
GEOMORPHIC SURFACE: T-2 (?)
LANDFORM: Terrace toeslope
ELEVATION: 700 ft. (213.5 m)
NATURAL VEGETATION: Deciduous forest (?)
PARENT MATERIAL: Alluvium - Colluvium
COLLECTED BY: D. L. Johnson and M. V. Miller, July 1, 1976
DESCRIBED BY: D. L. Johnson and M. V. Miller, Summer, 1976

HORIZON	DEPTH(cm)	SOIL DESCRIPTION
Ap	0 - 23	Very dark brown (10 yr 2/2 moist; 10 yr 3/2 dry) silt loam; weak fine to medium platy to weak medium subangular blocky; friable to firm; pH 6.2; abrupt smooth boundary to:
B_1	23 - 37	Very dark brown (10 yr 2/2 moist; 10 yr 4/1 dry) silt loam; moderate fine to medium subangular blocky; pH 6.55; firm; weak illuvial surfaces; gradual wavy boundary to:
B_{21}	37 - 69	Very dark gray brown (10 yr 3/2 moist; 10 yr 4/2 dry) silty clay loam; strong medium subangular blocky; firm; pH 6.7; well developed clay skins; gradual wavy boundary to:
B_{22}	69 - 102	Very dark gray brown (10 yr 3/2 moist; 10 yr 4/2 dry) silty clay loam; moderate medium subangular blocky; firm; pH 6.9; well developed clay skins; gradual wavy boundary to:
B_3	102 - 119	Dark brown (10 yr 3/3 moist; 10 yr 4/3 dry) loam; weak to moderate fine to medium subangular blocky; firm; pH 7.0; clay skins;
		Remarks: Sampling terminated at 119 cm. Monolith preserved (0-119 cm).

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EXPLANATION OF THE SOIL NAMES IN THE LEGEND

The soil names and symbols used in this map are adopted from [illegible] ...(SCS-USDA, Agriculture Handbook No. 436 1975). The names in the legend are descriptive if the reader understands the meanings of the formative elements which comprise the names. The formative elements are chiefly Greek and Latin roots that are familiar through their use in many common words (derivations and precise definitions of the complete names are given in *Soil Taxonomy*).

The names provide a tremendous amount of information about the soils, which is why the *Soil Taxonomy* system was adopted for this map. For example, the name Dystric Fluventic Eutrochrept (Fig. 1) provides the following information:

It is an immature soil having profile features more weakly expressed than mature soils and retaining close resemblances to the parent material; no horizon of clay accumulation is present (from *ept*).

The soil has a light colored surface horizon low in organic matter (from *ochr*).

It is a fertile soil high in bases (from *eutr*).

The soil is formed in alluvium on a floodplain probably of Holocene age (from *fluvent*).

There are no carbonates or calcareous materials above a depth of 1 m (from *dyst* in conjunction with the other formative elements).

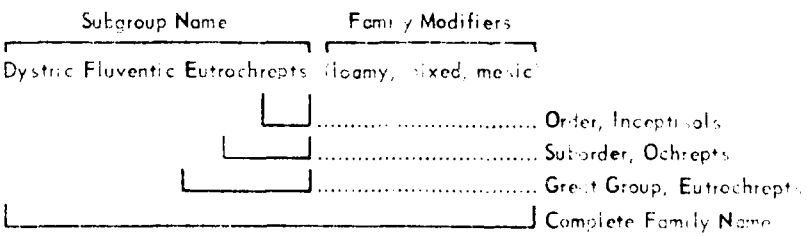
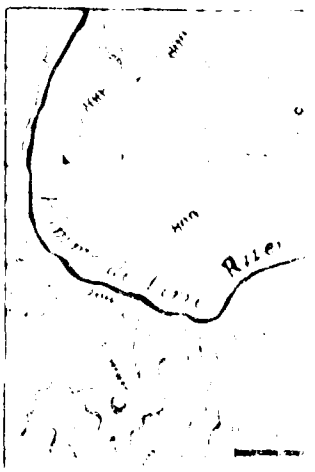
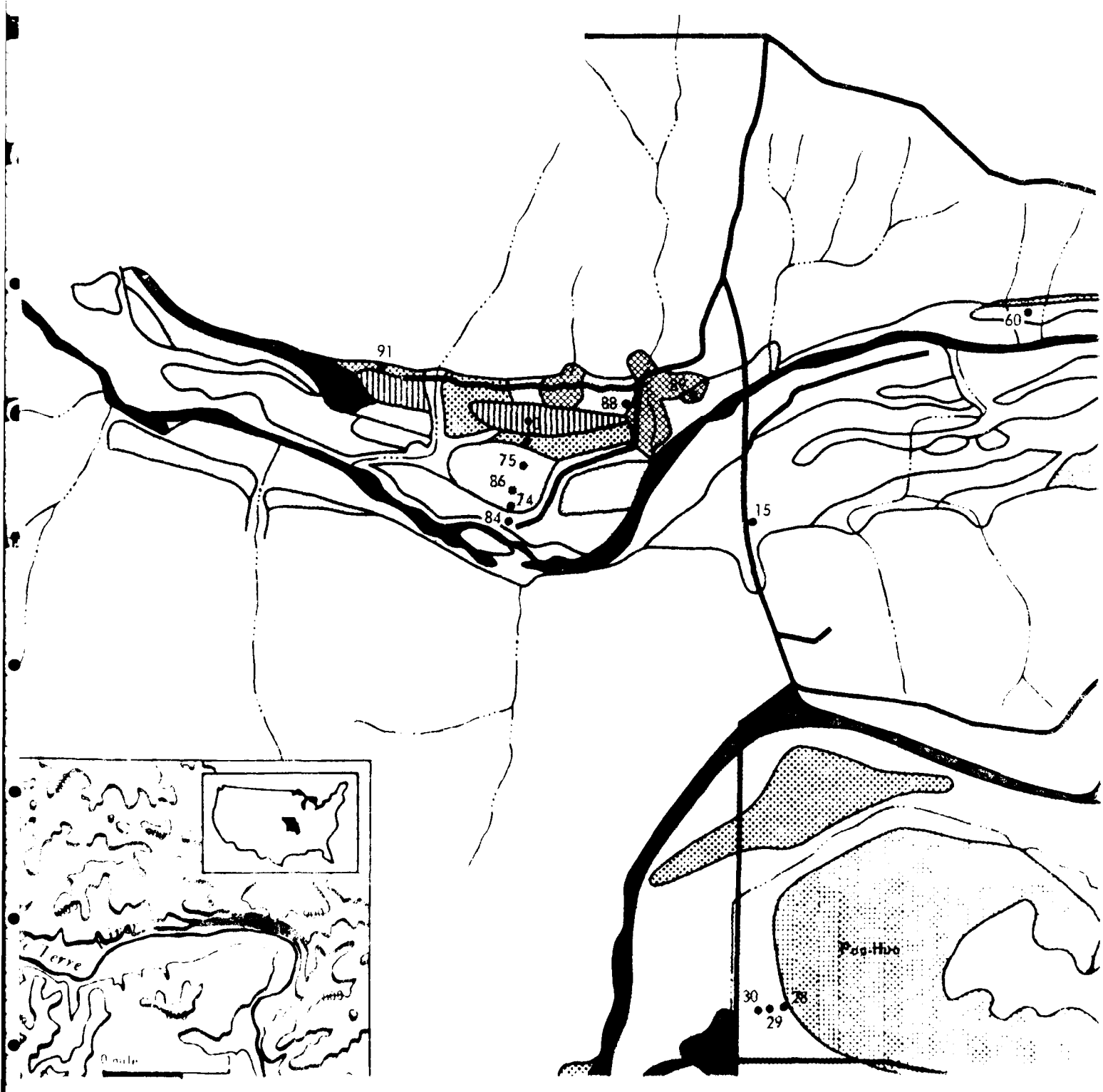


Figure 1



The Nomenclature of the Soil Taxonomy System

Names from all categories are used in constructing a complete family name. It is made up of a subgroup name followed by descriptive family modifiers. The subgroup name is a composite of the names of a suborder and great group and which ends in a syllable that identifies the soil order. For example, [illegible] are a subgroup of the great group of Eutrochrepts. [illegible] are a great group of the suborder Ochrepts. *Ochrept* are a suborder of the order of [illegible] soils. The names of the suborder great group, and subgroup all end in the syllable *ept*, which is the "formative element" in the name of the order (Inceptisol). In the name of an order the syllable that is the formative element is the last syllable beginning with a vowel and ending with the last consonant preceding the vowel that connects the suffix *sol*. All names of orders end in *sol*. The italicized syllables that follow are examples of formative elements in the names of orders: Inceptisols, M[illegible]isols, [illegible]


91
88
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74
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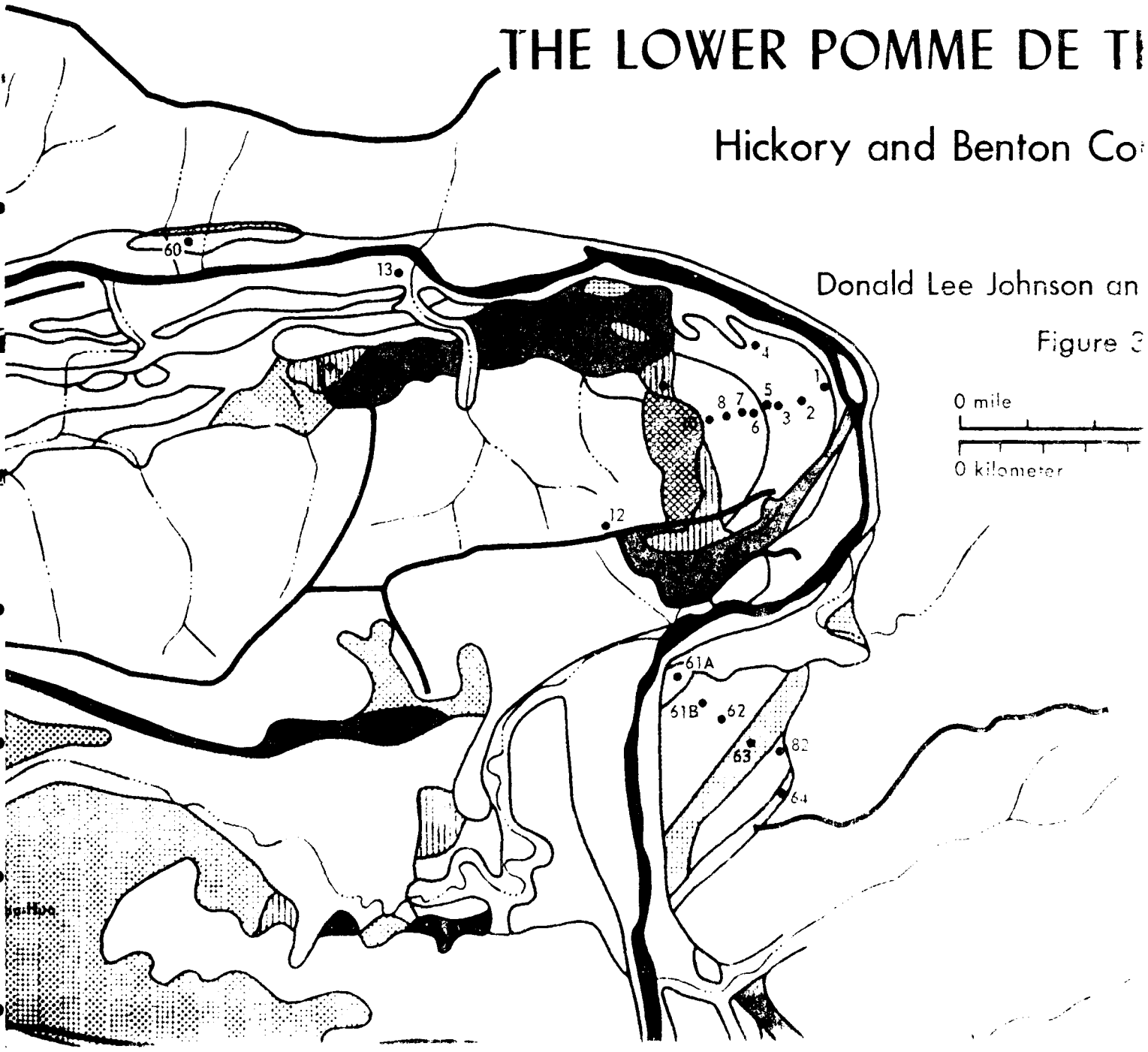
SOILS OF A SELECTE
THE LOWER POMME DE TI

Hickory and Benton Co

Donald Lee Johnson an

Figure 3

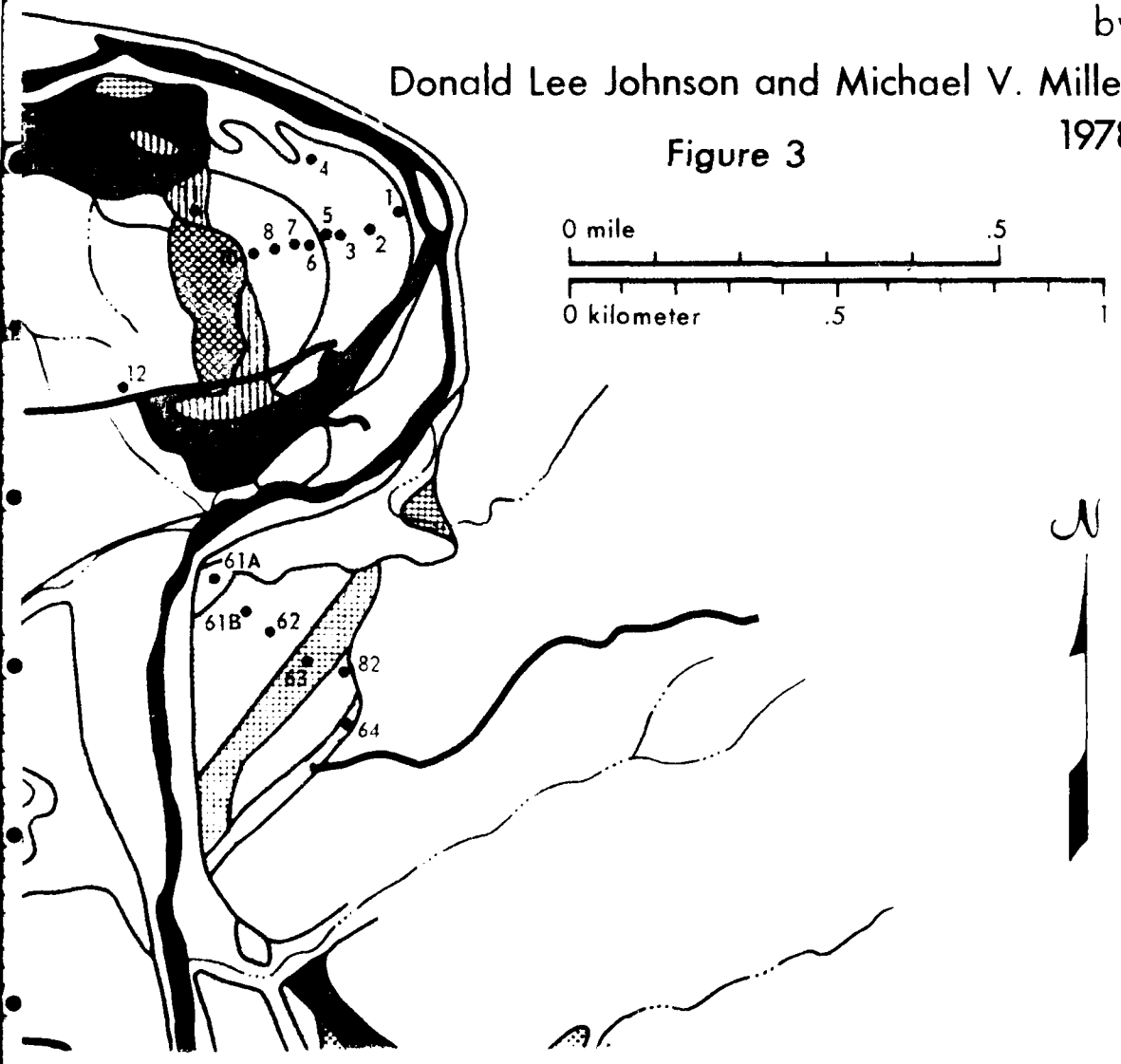


SOILS OF A SELECTED PART OF HE LOWER POMME DE TERRE RIVER

Hickory and Benton Counties, Missouri

by
Donald Lee Johnson and Michael V. Miller
1978

Figure 3



The soil is formed in alluvium on a floodplain, probably of Holocene age (from *fluvent*).

There are no carbonates or calcareous materials above a depth of 1 m (from *dystr* in conjunction with the other formative elements).

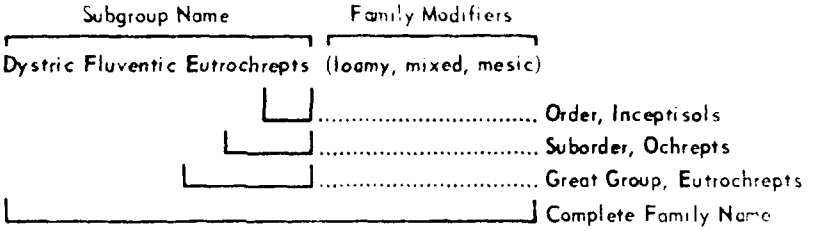
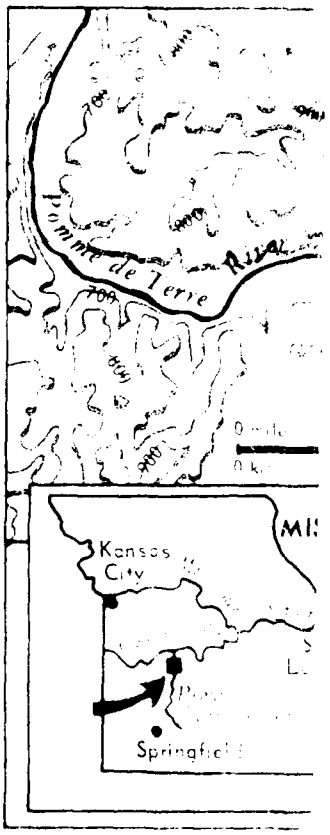


Figure 1



The Nomenclature of the Soil Taxonomy System

Names from all categories are used in constructing a complete family name. It is made up of a *subgroup name* followed by descriptive family modifiers. The subgroup name is a composite of the names of a suborder and great group and which ends in a syllable that identifies the soil order. For example, *Dystric Fluventic Eutrochrepts* are a subgroup of the great group of Eutrochrepts. *Eutrochrepts* are a great group of the suborder Ochrepts. *Ochrepts* are a suborder of the order of *Inceptisols*. The names of the suborder great group, and subgroup all end in the syllable *ept*, which is the "formative element" in the name of the order (Inceptisol). In the name of an order the syllable that is the formative element is the last syllable beginning with a vowel and ending with the last consonant preceding the vowel that connects the suffix *sol*. All names of orders end in *sol*. The italicized syllables that follow are examples of formative elements in the names of orders: Inceptisols, *Moll*isols, *Alf*isols, *Ent*isols, etc.

Orders

There are ten soil orders but only five occur on the map. Their names can be recognized as such because each ends, as stated, in *sol* (L. *solum*, soil), which is preceded by *a* as the connecting vowel in names coined from Greek roots or by *i* in names coined from roots of other origin.

In Table 1, the names of the five soil orders used on this map (column 1) and the formative element in each of the names (column 2) are given. Also listed are simplified definitions of the principal diagnostic properties of the soils in each order (column 3).

Order Name	Formative Element	Principal diagnostic properties (simplified definitions)
Alfisols	alf	Soils relatively low in organic matter, relatively high in bases; a subsurface horizon of clay accumulation.
Entisols	ent	Soils that have weak or no developed horizons; no deep wide cracks in most years.
Inceptisols	ept	Immature soils with some developed horizons and some weatherable minerals; no subsurface horizon of clay accumulation, relatively low in either organic matter or in bases, or in both.
Mollisols	oll	Soils with a thick dark surface horizon, relatively rich in organic matter, high in bases throughout, no deep wide cracks in most years.
Ultisols	ult	Old weathered soils with a subsurface horizon of clay accumulation; low in bases.

Table 1 - Orders, The Names and their meanings

Other Comments

Several [illegible] on the [illegible]
TUfo [illegible]

The subscripts indicate different degrees of [illegible]

Subarsine

Other Comments

of the sym ol in the legend are followed by a subscript (e.g. TUbp), which is a departure from the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61A
61B
62
63
64
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18
17
21
22
23
Benton County
Hickory County
40
39
41
42
38
35
73
72

		no deep wide cracks in most years.
Inceptisols	ept	Immature soils with some developed horizons and some weatherable minerals; no subsurface horizon of clay accumulation; relatively low in either organic matter or in bases, or in both.
Mollisols	oll	Soils with a thick dark surface horizon, relatively rich in organic matter; high in bases throughout; no deep wide cracks in most years.
Ultisols	ult	Old weathered soils with a subsurface horizon of clay accumulation, low in bases.

Table 1 - Orders: Their names and their meanings

Suborders

The name of a suborder has [illegible] Its last syllable is the formative element from the name of the order. The first syllable connotes additional diagnostic properties of the soils in the suborders. Thus, an Entisol that has an aquic moisture regime throughout is called an *Aquent* (L. [illegible], plus ent from Entisol); an Entisol that consists of very young sediments is called a **Fluvent** (L. [illegible], river, plus ent from Entisols).

Table 2 lists first formative elements of suborder and great group names used in [illegible] map and the simplified explanations of their connotations.

Formative Element	Connotation (simplified explanation)
alb	A nearly white leached A_2 horizon near the surface, reflecting wetness
aqu	A soil that is very wet
arg	A soil having a subsurface horizon of clay accumulation
dystr	Low base saturation
flu	Composed of recent alluvium
frag	Presence of a fragipan
hapl	The simplest set of horizons
ochr	A surface horizon that is either light in color or low in organic matter, or both
orth	The most representative; true orthents are on recently eroded slope
pale	An old soil having horizons that show strong development
ud	Moist but not wet, dry for short periods or not at all
ust	Dry for long periods but moist in a growing season for 90 days or more in most years; droughts common

[illegible]

Great Groups

The name of a great group has three or four syllables. The last two syllables are the name of the suborder. The first syllable in the name of a great group connotes additional diagnostic properties of the soils in that great group. The second syllable generally is formed when a vowel is added to connect the first syllable to the last two syllables (the name of the suborder). For example, an Alfisol in the suborder of Aqualfs and in which a fragipan occurs is called a Fragiaqualf; an Entisol in the suborder of Fluvents that is moist but not wet is [illegible]ent.

Subgroups

Great groups are [illegible] and extragrade. [illegible] adjectives before [illegible]

A [illegible] typic subgroup, [illegible] of soil in the [illegible]

An [illegible] name it carries [illegible] taxon or more th[illegible] adjective or adj[illegible] names of the oth[illegible] Thus, if a soil [illegible] the first formati[illegible] modify the name [illegible] a different subo[illegible] different suborde[illegible] name. Follow[illegible]

Name of Great Gr[illegible]
Eutrochrep[illegible]
Paleudal[illegible]

The name of an [illegible] an intergrade s[illegible]

An extragrade [illegible] to any known k[illegible] soil. Conseque[illegible] 50 cm is placed [illegible] Following are [illegible] forming n[illegible]

Subg[illegible]
Lithic Us[illegible]
Typic Fr[illegible]
Aquic Ar[illegible]
Typic Ha[illegible]

Subgroups

Great groups are separated into three kinds of subgroups: Typic, intergrade, and extragrade. The name of a subgroup is formed by placing one or more adjectives before the name of the relevant great group.

A [illegible] represents the central concept of its great group. A soil in a [illegible] subgroup, however, is not necessarily more extensive than the other kinds of subgroups in the same great group.

An [illegible] has the definitive properties of the great group whose name it carries as a substantive. It also has some of the properties of another taxon or more than one other taxon--an order, a suborder, or a great group. The adjectives or adjectives in the intergrade subgroup name are formed from the names of the other taxon or taxa. Formative elements normally are not repeated. Thus, if a soil is an intergrade between two great groups in the same suborder, the first formative element of an great group is used in adjective form to modify the name of the other great group. If a soil is an intergrade to a soil of a different suborder in the same order, the final formative element in the different suborder name is not used as an adjective in the intergrade subgroup name. Following are some examples.

Name of Great Group	Taxon(s) To Which It Intergrades	Subgroup Name
Eutrochrept	Fluvent and Dystrochrept	Dystric Fluvaquentic Eutrochrept
Paleudalf	Ultisol	Ultic Paleudalf
	Aqualf	Aquic Paleudalf

The name of any taxon, converted to an adjective, can be used in the name of an intergrade subgroup.

An [illegible] has aberrant properties that do not represent intergrades to any known kind of soil. Hard rock, for example, is not considered to be soil. Consequently, a soil with underlying hard rock at a depth of less than [illegible] is a subgroup. An example is Lithic Ustorthent. Following are examples of how the nomenclature of the taxonomy is applied in [illegible] subgroups:

[illegible]	Great Group	Suborder	Order
Lithic Ustorthent	Ustorthent	Orthent	Entisols
Typic Fragiaqualf	Fragiaqualf	Aqualf	Alfisol
Aquic Argiudoll	Argiudoll	Udoll	Mollisol
[illegible]	Haplaquoll	Aquoll	Mollisol

Several of the symbols in the [illegible] TUfe$_2$ which is a departure fr[illegible]

The subscripts indicate differe[illegible] same subgroup. For example, [illegible] development, respectively, of [illegible] designated TUfe$_1$ are of similar [illegible] stratification that was probably [illegible] enough time has lapsed to [illegible] soils, however, are older than [illegible] destroyed by bioturbation.

Finally, the order of increasing [illegible] area is Entisol--Inceptisol--A[illegible] spatial distributions of the soi[illegible] to the river, the Ultisols being

ALFISOLS

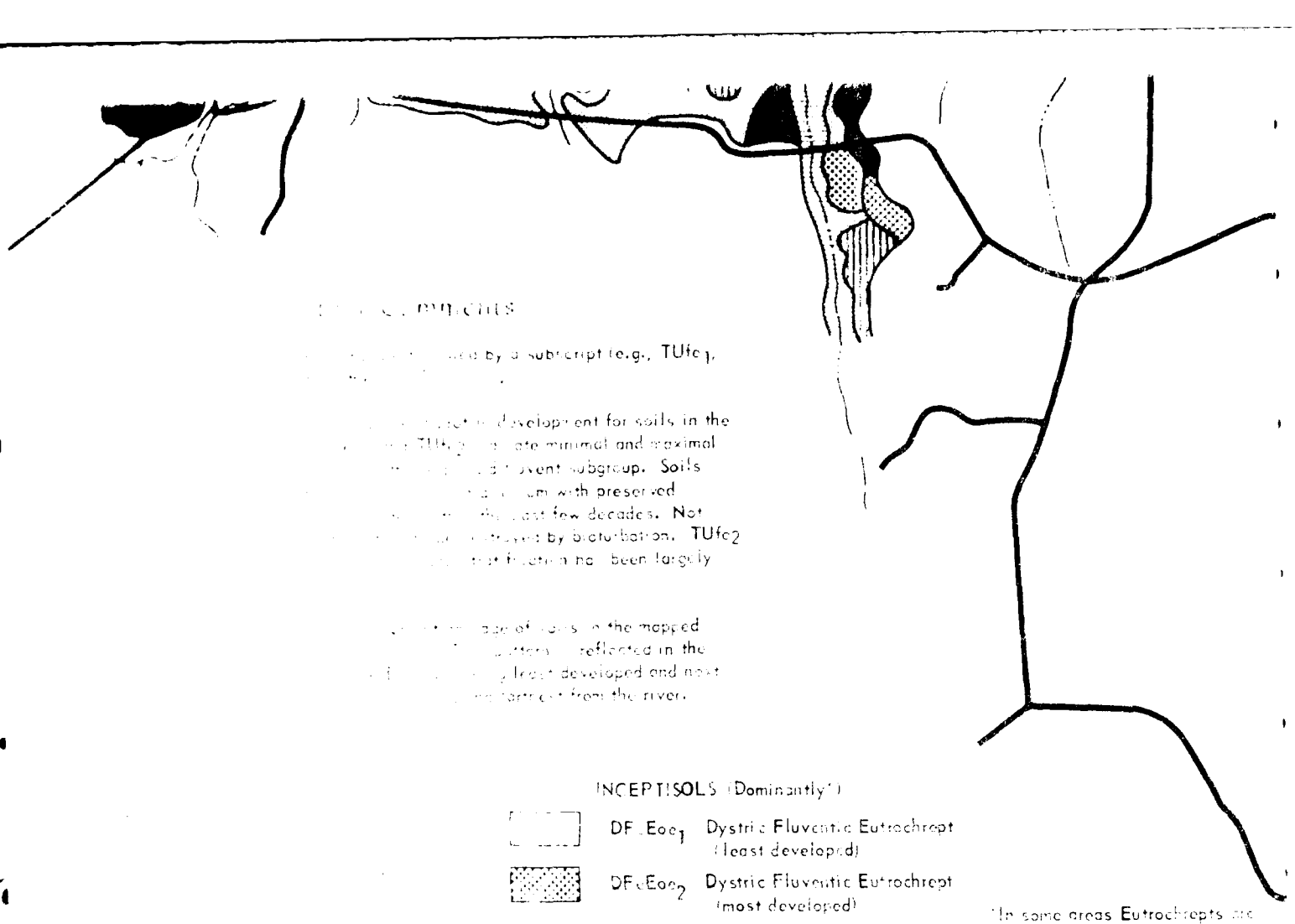
	TPua	Typic Pa[illegible]
	APuc	Aquic Pa[illegible]
	TAca	Typic A[illegible]
	TFac	Typic Fra[illegible]
	TOaa	Typic Ochr[illegible]
	Hua	Haplu[illegible]
	UPua	Ultic Pa[illegible]

ENTISOLS

	LUaa	Lithic U[illegible]
	TUfe$_1$	Typic Ud[illegible] least de[illegible]
	TU[illegible]$_2$	Typic Ud[illegible]

ALFISOLS-ENTISOLS

	TPua-LUa



...DIFIERS

...ed by a subscript (e.g., TUfc$_1$).

...development for soils in the ... TUfc$_1$ ... ate minimal and maximal ... dominant subgroup. Soils ... um with preserved ... the last few decades. Not ... disturbed by bioturbation. TUfc$_2$ ... soil formation has been largely

... age of soils in the mapped ... pattern reflected in the ... least developed and most ... farthest from the river.

INCEPTISOLS (Dominantly*)

	DFcEoe$_1$	Dystric Fluvaquentic Eutrochrept (least developed)
	DFcEoe$_2$	Dystric Fluvaquentic Eutrochrept (most developed)
	Hae	Typic Haplaquept

MOLLISOLS

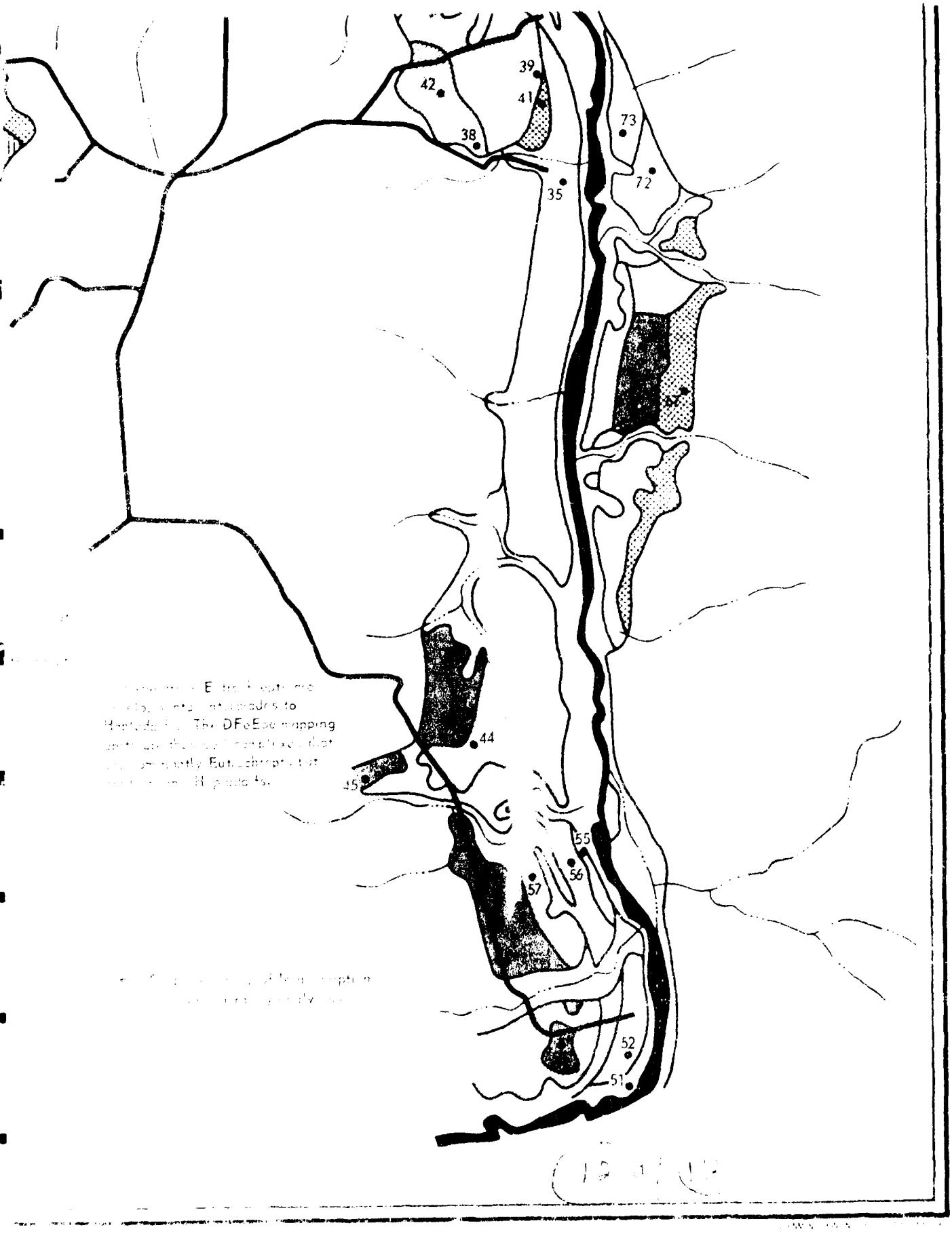
	THae	Typic Haplaquoll
	TAae	Typic Argiaquoll
	VAae	Vertic Argiaquoll
	AAue	Aquic Argiudoll
	THue	Typic Hapludoll
	TH...	...Hapludoll
	TH...	...Hapludoll

*In some areas Eutrochrepts are developmental intergrades to Hapludalfs. The DFcEoe mapping units are thus soil complexes that are dominantly Eutrochrepts but contain some Hapludalfs.

...

...TISOLS-UPLAND ASSOCIATIONS

... Paleudalfs-Lithic Ustorthents
... Hapludalfs-Typic Paleudult
... Association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